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ABSTRACT

The National Audubon Society is concerned with dependencies of wildlife and life support systems on this planet. Recognizing the role humans play in the interrelationships, Dr. Russell W. Peterson, Audubon's president, established the Population Program within the society's Environmental Policy Analysis Department to: analyze population, resource, and environment information; educate Audubon members and others on population, resource, and environment relationships; and assist in designing strategies for limiting population growth. This annotated bibliography, intended primarily for U.S. audiences, is one of the Population Program's efforts, citing readily accessible literature and focusing on publications covering resources and population from an environmental perspective. Citations are presented alphabetically by author under each of the following headings: general; conferences on various aspects; desertification; deforestation; energy; food and agriculture; climate; development; reports, modeling and future studies; policy recommendations; and other bibliographies (dealing with similar topics). Publication difficulty rating is provided for each citation, indicating if it is easy to understand, of medium difficulty, or technical. Each section is preceded by an introduction to the subject area and citations therein, and is concluded with a list of citations that deal with the subject area but have annotations in other parts of the bibliography. (JN)

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ANNOTATED BIBLIOGRAPHY ON POPULATION, RESOURCES AND ENVIRONMENT RELATIONSHIPS

Seth Hollander
September 1982

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ANNOTATED BIBLIOGRAPHY
ON
POPULATION, RESOURCES AND ENVIRONMENT
RELATIONSHIPS

Seth Hollander*

September 1982

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PREFACE

"Almost every worrisome environmental trend has at its root one recurring cause: we are asking a finite and fragile planet to support too many people." That is the belief of Dr. Russell W. Peterson, President of the National Audubon Society. The Society, recognizing the impact of population on the living creatures of the natural environment and on the Earth's resources -- elements of primary concern to its members -- has made working toward a U.S. population policy and stabilization of world population one of its "Action Priority Goals."

To achieve its goals, an informed, concerned public is needed. This Bibliography was developed to provide information to those interested in pursuing the complex relationships in the world around us.

We hope you will find it useful.

Glenn Paulson, Ph.D.
Vice President for Science

Frances Breed
Manager-Population Program

FOREWORD

I was first exposed to many of the ideas and thoughts contained in the publications listed in this bibliography during a seminar on Population and the Environment given at Grinnell College, where I did my undergraduate work. My interest and contact with this area of knowledge further developed though participation with the then newly formed Global Tommorrow Coalition and during an internship with the National Audubon Society, funded in part by the Jessie Smith Noyes Foundation.

Experience during my internship led me to discover several things about people's knowledge of global issues. First, of course, is that this general area is complex. As a corollary, professionals working on any part of the problem must make special efforts to learn from and communicate adequately with others. In addition, I discovered that there was great interest from National Audubon members in these issues and in learning more about them. Many other citizens also have expressed interest. For such people, I hope this volume will open new paths to knowledge.

But, ultimately, I hope the bibliography, and those publications listed in it, will help people gain new insights into the way they view the world and its problems. Just to recognize mentally the global complexities and to include some of this knowledge in personal decisions will be beneficial and will help effect change. The creation of better solutions to these problems will be essential in the process of building a more sustainable society.

The actual search for publications began with the examination of the references used in the Global 2000 Report and several other recent global reports. It expanded beyond that level with the suggestions of various reviewers and with analysis of other bibliographies and publication lists.

This year-long effort has been very rewarding. I have learned a great deal from reading these publications. I hope that others will as well.

I am most grateful to the National Audubon Society for enabling me to study these publications and to have contact with many competent professionals in these fields, and I particularly value the guidance provided by Ms. Frances Breed of Audubon.

Seth Hollander
New York, September 1982

ACKNOWLEDGMENTS

I am grateful for the helpful comments and suggestions received from the following reviewers:

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Maureen Hinkle
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Russell W. Peterson

INTRODUCTION

In the past ten years, many people have changed their views of society, resources and environmental consequences of obtaining and using materials. Several events helped: the oil embargo; the environmental movement; the Iranian revolution; U.N. conferences on Environment (Stockholm, 1972), Food (Rome, 1974), Population (Bucharest, 1974), Human Settlements (Vancouver, 1976) and Desertification (Nairobi, 1977); the Global 2000 Report to the President; the World Conservation Strategy; the North-South Report; the World Development Report 1980 and numerous models, analyses and publications. All contributed to understanding dependencies between global environment, resources and population.

We know now that workable solutions require technology, economics, and environmental, socio-political and global elements. We need the assistance of many professionals, although citizen choice and governmental units will decide the future.

The National Audubon Society is concerned with dependencies of wildlife and life-support systems on this planet. Recognizing the role humans play in the interrelationships, Dr. Russell W. Peterson, Audubon's President, established a population program within the Society's Environmental Policy Analysis Department. The program seeks to:

- Analyze population, resource and environment information.
- Educate Audubon members and others on population, resource and environment relationships.
- Assist in designing strategies for limiting population growth.

This annotated bibliography is one of the Population Program's efforts and is an initial guide for National Audubon Society members, friends and other concerned citizens. It primarily cites readily accessible literature and focuses on publications covering resources and population from an environmental perspective. Publications are drawn from many subject areas, including human ecology, land use, agriculture and food, archeology, geography, climatology, demography, natural resources and energy policy. It covers, however, only a a small fraction of what is available and is primarily intended for a U.S. audience.

We believe that better understanding of population, environment and resources will lead to active citizen participation in the search for solutions to the many issues in this critical and complex area.

TABLE OF CONTENTS

	Page
Preface	i
Foreword	ii
Acknowledgements	iii
Introduction	iv
Illustrations of Relationships between Population, Resources and the Environment.	
General	1
Conferences on Various Aspects	20
Desertification	23
Deforestation	26
Energy	31
Food and Agriculture	37
Climate	45
Development	50
Reports, Modeling and Future Studies	56
Policy Recommendations	64
Other Bibliographies	72
Publisher Addresses	74

NOTE: Listed prices are subject to change.

o.p. = out of print.

Publication Difficulty Rating:

Easy to understand: no asterisk

Medium difficulty: one asterisk *

Technical: two asterisks **

ILLUSTRATIONS OF RELATIONSHIPS

GENERAL

Population, resources and environment have been interrelated since long before the evolution of homo sapiens. The connections were not noticed philosophically, at least in the Western world, or academically until fairly recently. In the distant past, people generally were able to live harmoniously with local environment through long-held religious, social and cultural customs. But since societies have become complex, economic and environmental problems have grown to global proportions. The world has become a large "commons." Problems are no longer as understandable or as solvable as they once were. For example, resource shortages in the past were often alleviated by migration. This is now a less viable option due to political boundaries and more people.

Several ideas in current economic and political thought come from the 1700s and the Age of Enlightment. These include the notion that world resources are limitless and that continued economic and material growth is good.

One of the first people, during this era, to recognize potential failure in world functioning was Thomas Malthus, who postulated in his classic 1798 Essay on the Principle of Population that population would grow geometrically and food production arithmetically. His ideas helped create the division between optimists and pessimists over the world's future.

Post-World War II writers began to reconsider Malthus in light of burgeoning global population and rapid technological growth. Among the books from this period were William Vogt's Road to Survival and Harrison Brown's The Challenge of Man's Future. With the advent of the environmental movement in the late 1960s and early 1970s, the interrelation of population, resources and environment was developed in such works as Ehrlich and Holdren's Ecoscience: Population, Resources, Environment; Kenneth E.F. Watt's The Titanic Effect and René Dubos and Barbara (Ward) Jackson's Only One Earth.

But recognition of environmental problems did not mean agreement on causes. In 1968 Paul Ehrlich, in his book, The Population Bomb, placed the blame largely on growth of population and per capita consumption. Barry Commoner, on the other hand, faulted misapplied technology in his book, The Closing Circle. They and others debated their views in a series of articles reprinted in Population, Environment and Quality of Life. Perhaps Garrett Hardin, author of "The Tragedy of the Commons," best summarized the debate when he said that both arguments had merit and were performing an educational service.

The idea that global problems are interrelated has become widely accepted but not totally so. Recently, economist Julian Simon challenged the theory in his book, The Ultimate Resource. He is optimistic that people and technology can solve problems, and he questions data collection and interpretation by government agencies and environmental and population organizations. Simon has been heavily criticized, but he also has received much positive press coverage. His overall message alarms many who see it as a denial of interrelationships and as placing excessive reliance on market forces to prevent disaster.

By any measure, progress in the study of population, environment and resources has been remarkable in the past decade. Further research and broad public educational efforts are needed for wise debate. The Global Tommorrow Coalition and the Worldwatch Institute are but two organizations that have been formed to further this work.

GENERAL

1.* Abelson, P.H. and A.L. Hammond, eds. Materials: Renewable and Non-Renewable Resources. Washington, D.C.: American Association for the Advancement of Science, 1976. 196pp. $3.50

A series of articles with both optimistic and pessimistic viewpoints on the availability and environmental impact of renewable and nonrenewable resources.

2. ** Baker, Paul ed. Human Population Problems in the Biosphere: Some Research Strategies and Designs. Man and the Biosphere Technical Notes 3. Paris: UNESCO, 1977. Available through UNIPUB, New York. Order #U288. 82pp. $6.25

Focuses on the interactions between human populations and the environment.

3.* Barnet, Richard J. The Lean Years: Politics in the Age of Scarcity. New York: Simon and Schuster, 1980. 349pp. $7.25

Examines the politics of world resource distribution, explains the costs involved in resource extraction and reveals the interdependency of nations. Also emphasizes the unequal distribution of resources both within and among the nations and the role that multinational corporations play in this distribution.

4. ** Barnett, Harold J. and Chandler Morse. Scarcity and Growth: The Economics of Natural Resource Availability. Baltimore: Johns Hopkins Press, 1963. 288 pp. $5.95

A preliminary theoretical examination of increasing natural resource scarcity and its effects. This widely cited work has been misinterpreted by later writers to mean that scarcity will never arise.

5. Bikales, Gerda. "Immigration Policy: The New Environmental Battlefield," National Parks and Conservation 51 (12), December, 1977. pp. 13-16

An article linking immigration and environmental degradation. Describes the increases in legal and illegal immigration in recent years, and explains why a stronger immigration policy is needed.

6.* Biswas, Margaret R. "Population, Resources, Environment: A Global Perspective," Engineering Issues. 104 (1), Jan. 1978, pp. 75-84.

Discusses, on a global basis, the interrelationships and the recent crises among population, resources and the environment. Notes that distribution of resources is one of the key problems. Warns that engineers alone cannot solve these problems. Maintains that solutions will also depend on the effort of the general public, governmental agencies and politicians.

7.* Brooks, David and Peter W. Andrews. "Mineral Resources, Economic Growth and World Population," In Materials: Renewable and Non-Renewable Resources. (See Abelson, Philip H. annotation), pp. 41-47.

An optimistic article which concludes that during the next 30 to 50 years world mineral supplies will keep up with growing world population and growing world income. The authors caution that there will be environmental costs, problems in developing countries and political difficulties relating to the production and distribution of minerals.

8.* Brown, Harrison. The Challenge of Man's Future. New York: The Viking Press, 1954. 290pp. o.p.

A pioneering overview about the global relationships between population growth and finite resources. Reviews statistics and trends in the areas of population, energy, food, minerals and water. Speculates on three possible scenarios for the future.

9. Brown, Lester R. Resource Trends and Population Policy: A Time for Reassessment. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 29), 1979. 55pp. $2.00

A paper stressing the importance of checking population growth so that the world's major renewable resource systems (fisheries, forests, grasslands and croplands) can be maintained. Relates recent economic and social stresses to strains in these renewable (and also nonrenewable) resource systems. Concludes by examining various population policies and proposing a population stabilization timetable.

10. Brown, Lester R. The Twenty-Ninth Day: Accommodating Human Needs and Numbers to the Earth's Resources. New York: W.W. Norton Co., 1978. 363pp. $6.95

    Ecological stresses in the world's four major biological systems (fisheries, forests, grasslands, and croplands) are documented. Outlines the human causes and consequences of these stresses. Offers a program for improvement of the world's ecological, economic and social systems so that human needs can be accommodated to the Earth's resources.

11. Brown, Lester R. Redefining National Security. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 14), 1977. 46pp. $2.00

    Adapted from the author's book, The Twenty-Ninth Day, this paper concludes that national security involves social and environmental factors as well as military might. Links national security to the stability of biological systems, economic trends, energy and food supply, and climate -- all of which are threatened by population growth and rising per capita income.

12. Brown, Lester R. World Population Trends: Signs of Hope, Signs of Stress. Washington: Worldwatch Institute (Worldwatch Paper 8), 1976. 40pp. $2.00

    Consisting largely of material drawn from the author's book, The Twenty-Ninth Day, this paper notes the progress made toward reducing the rate of population growth, as well as the tragic rise in death rates during the seventies in many poor countries. Attributes the rise in death rates partially to food scarcity. The need for further development of national population policies to accommodate each country's resources is emphasized.

13. Brown, Lester R., Patricia L. McGrath and Bruce Stokes. Twenty-two Dimensions of the Population Problem. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 5), 1976. 55pp. $2.00

    Discusses population growth and its relation to health services, pollution, hunger, individual freedom, water, unemployment, minerals, political conflict, deforestation, urbanization, crowding, overgrazing, climate change, housing, oceanic fisheries, literacy, natural recreation areas, environmental illnesses, inflation, endangered species and energy.

14. ** Carpenter, Richard A. "Tensions between Materials and Environmental Quality," Science 191 (4227) Feb. 20, 1976. pp. 665-68.

    Treats the nature of the relationship between environmental quality and the availability of materials.

15. Catton, William R., Jr. Overshoot: The Ecological Basis of Revolutionary Change. Urbana, Ill.: University of Illinois Press, 1980. 298pp. $16.50

    Claims the human race has already "overshot" the Earth's carrying capacity. Stresses the need for people to think with an ecological perspective and offers several interesting phrases.

16. Commoner, Barry. The Closing Circle: Nature, Man and Technology. New York: Bantam Books, 1972. 343pp. $3.95.

    Surveys the damage that has been done to the Earth's environment by human activities and offers an analysis of the causes. Blames misapplied technology and a breakdown in economic, social and political systems, although the population factor is ignored.

17. Council on Environmental Quality. Environmental Trends. Washington, D.C.: U.S.G.P.O., 1981. 346pp. $11.00

    An excellent collection of graphic information and statistics on trends in environment, including land, solid waste, human settlements, cropland, forests, rangeland, wildlife, energy, water resources, water quality, air quality, population and transportation.

18. Critchfield, Richard. Villages. New York: Doubleday, 1981. 388pp. $17.95

    An optimistic and personalized account of some of the changes and improvements that have occurred in family planning, agriculture and other aspects of village life during the past decade in the developing world.

19.* Daly, Herman E. Steady State Economics. San Francisco: W.H. Freeman, 1977. 185pp. $7.95

Outlines the possibilities of a steady state economy and critically examines the philosophy of growth. Contains chapters on growth and its influence on energy and development programs. Illustrates some of the relationships between population, resources and the environment.

20.* Dasmann, Raymond F. Environmental Conservation. New York: John Wiley and Sons, 1972. 375pp. $17.50

A textbook intended for a one-semester course on man and the environment with a special emphasis on North America. Treats the problems of population, energy, minerals and food supplies.

21. Eckholm, Erik (foreward by Barbara Jackson). Down to Earth: Environment and Human Needs. New York: W.W. Norton, 1982. $14.95

A sequel to Only One Earth (See Ward and Dubos), which was published in 1972. Examines the interlocking concerns of environment and development. Reviews progress (or setbacks) during the past decade in pollution, tropical forests, arable land, climate, human health, species diversity and firewood. Recommends actions to alter setbacks.

22. Eckholm, Erik. The Dispossessed of the Earth: Land Reform and Sustainable Development. Washington, D.C.: Worldwatch Institute (Worldwatch paper 30), 1979. 48pp. $2.00

Points out the inefficiencies of current land tenure systems in many developing countries. Stresses the need to make land distribution more equitable in order to reduce the vicious cycle of poverty and hunger, and to help build a future that is politically, economically and ecologically sustainable.

23. Eckholm, Erik. The Picture of Health: Environmental Sources of Disease. New York: W.W. Norton, Inc., 1977. 256pp. $4.95

Examines critically government policies, social structures and individual life-styles that can lead to poor health in both developing and developed countries.

24. ** Ehrlich, Paul R., Anne H. Ehrlich and John P. Holdren. Ecoscience: Population, Resources, Environment. San Francisco: W.H. Freeman and Co., 1977. 1051pp. $24.95

A comprehensive and well-documented textbook on population, resources, environment and their interactions. Covers the social, political and economic dimensions of these interactions. Proposes changes which would relieve current and anticipated stresses.

25.* Ehrlich, Paul R., Anne H. Ehrlich and John P. Holdren. Human Ecology: Problems and Solutions. San Francisco: W.H. Freeman and Co., 1973. 304pp $11.95.

An abbreviated version of the text Ecoscience: Population, Resources, Environment. Includes recommendations for population limitation and change in economic, social and political systems aimed at reducing population, resource and environmental stress.

26.* Ehrlich, Paul R. and John P. Holdren, "Impact of Population Growth," Science 171 (3977), March 26, 1971 pp.1212-17.

Explores the interrelationship of global population growth, rising affluence, technological change, resources and the environment. Recommends population control along with other solutions.

27. Ehrlich, Paul R. The Population Bomb. New York: Ballantine, 1968 (2nd Edition), 1971. 201pp. $2.50

Well-known book that aroused great popular attention. Includes information on contemporary activities and recommendations for further action.

28. Gillman, Katherine. "Julian Simon's Cracked Crystal Ball," The Public Interest (65) Fall, 1981. pp. 71-80.

A rebuttal of Simon's earlier review of the Global 2000 Report (see Simon, "Global Confusion, 1980" annotation). Finds flaws in Simon's data interpretation.

29. Goeller, H.E. and Alvin M. Weinberg. "The Age of Substitutability," Science 191 (4228), Feb. 20, 1976. pp. 683-689.

Provided enough energy is available to run extraction machines, the authors are optimistic that raw material supplies will be adequate. When certain elements have been exhausted, they recommend substitution as a solution.

30. Green, Cynthia P. People: An Endangered Species? Washington, D.C.: National Wildlife Federation, 1979. 14pp. free.

A highly readable work reviewing the dynamics and dimensions of human population growth. Discusses food shortages, urbanization, pollution, energy, scarcity, deterioration of natural areas, the need for family planning and changes in government policy.

31. Green, Ambassador Marshall and Robert A. Fearey. World Population: The Silent Explosion. (Department of State Bulletin reprint) Washington D.C.: U.S.G.P.O., 1978. Stock #044-000-01710-5 32pp. $1.75

Reviews basic facts and trends in world population. Explores the effect of population growth on economic development, food supply, environment and politics. Describes present programs and policies designed to reduce the rate of population growth and recommends further action.

32. Hardin, Garrett. "Dr. Pangloss Meets Cassandra," The New Republic. October 28, 1981. pp. 31-34

A critical review of Julian Simon's book, The Ultimate Resource (see annotation). Discusses the concept of finitude and its relevance to agricultural land, energy, food and minerals.

33. Hardin, Garrett. "The Tragedy of the Commons," Science 162, Dec. 13, 1968. pp. 1243-48.

Well-known essay in which the author reintroduces the "commons" concept -- the theory that self-interest leads to overuse and eventual ruin of the common for everyone.

34.** Hassan, Fekri A. Demographic Archaeology. New York: Academic Press, Inc. 1981. 298pp. $32.00

Includes chapters on carrying capacity and population pressure and the peopling of the world.

35.* Holdren, John P. and Paul R. Ehrlich. "Human Population and the Global Environment," American Scientist vol. 62, No. 3, May-June 1974. pp. 282-292

Shows how pollution, population growth, rising per capita consumption, technological changes and other subtle factors combine to create a major force for disrupting ecological systems. Explains the importance of quick action (population limitation, in particular) in view of the rapidity of exponential growth and the time lags between cause and effect in environmental systems.

36.* Jackson, Barbara (Ward). The Home of Man. New York: W.W. Norton Company, Inc., 1976. 297pp. $3.95

Follows the growth of the world's cities and villages, describing the social and environmental problems associated with rapid growth. Discusses agriculture, energy, resource, transportation, water and development-related issues.

37.* Jackson, Barbara (Ward) and René Dubos. Only One Earth: The Care and Maintenance of a Small Planet. New York: Norton, 1972. 225pp. $13.95

An unofficial report commissioned by the secretary-general of the United Nations Conference on the human Environment which functioned as a background document for that conference. Examines the relationship between man and his environment in its totality. Discusses political, economic, social and environmental aspects of population resources, technology, urbanization and development.

38.* Keyfitz, Nathan. "World Resources and the World Middle Class," Scientific American 235 (1), 1976. pp.28-35.

Predicts that further growth of the world's middle class will be limited by production and environmental constraints. Recommends development of new scientific and technical expertise to accelerate the number of people entering this class.

39. Livingston, John A. "On the Relevance of Lungfish, Lilacs, Wolves and Spirit Levels in Resource Constrained Economies," Journal of Soil and Water Conservation vol. 35, No. 4, July-August, 1980. pp. 165-170.

An interesting analysis of current natural resource shortages, the "commons" concept, quality of life and population growth.

40.** Macfarlane, Alan. Resources and Population: A Study of the Gurungs of Nepal. New Rochelle: Cambridge University Press, 1976. 364pp. $44.50

Studies the relationship between population and resources among the Gurungs of Nepal, a formerly nomadic tribe, from an anthropological point of view. Examines the case from the perspective of Malthusian theory.

41.* Malthus, Thomas Robert. An Essay on the Principle of Population (A Norton Critical Edition edited by Philip Appleman) New York: W.W. Norton and Co., 1976. 260pp. $5.95

A Norton critical edition of Malthus' famous essay which hypothesized that population increases geometrically while subsistence increases arithmetically. Also included are essays by those who influenced and further developed Malthus' thinking, as well as those who criticized his premise.

42.* Marden, Parker G. and Dennis Hodgson, eds. Population, Environment and the Quality of Life. New York: AMS Press, Inc., 1975. 328pp. $24.00.

A series of articles about the relationships between population and the environment. Included are: Hardin's "Tragedy of the Commons" (see annotation); Crowe's "Tragedy of the Commons Revisited" (see annotation); a series of articles produced in debate between Barry Commoner, Paul Ehrlich and John Holdren on the role of population in environmental deterioration (see May and June 1972 issues of Bulletin of Atomic Scientists); and Ehrlich and Holdren's "Impact of Population Growth" (see annotation).

43. McHale, John. World Facts and Trends: Where Man Is Headed -- A Multi-Dimensional View. New York: MacMillan, 1972. 95pp.

A graphic representation of trends in population, resources and the environment.

44.* Miles, Rufus Jr. Awakening from the American Dream: The Social and Political Limits of Growth. New York: Universe Books, 1976. 246pp. $4.95.

Discusses the origins and future prospects of American affluence; vulnerabilities in American society; the incorporation of energy into society; the dynamics of food and population in America and the Third World; and the political and environmental limits to growth.

45. Miller, George Tyler, Jr. Living in the Environment: Concepts, Problems and Alternatives. (3rd Edition) Belmont, California: Wadsworth Publishing Company, 1975. 380pp. (Main text) 161pp. (enrichment), 38pp. (appendix) $23.95

An excellent college-level text covering basic concepts in ecology and exploring the relationships among population, resources, economics, politics and the environment. Contains guest editorials by well-known professionals and includes a cross-referenced "Enrichment Studies" section.

46.* Murdoch, William W. ed. Environment: Resources, Pollution and Society. Sunderland, Mass.: Sinauer Associates, 1975. 488pp. $14.95

A collection of essays in textbook form on the relationship between Man and Earth. Examines the inability of the present global resource base to sustain a growing population, deals with air and water pollution and treats the politics of ecology and the urban environment.

47. Murphy, Elaine M. World Population: Toward the Next Century. Washington, D.C.: Population Reference Bureau, 1981. 17pp. $1.00

A guide to current population trends for the nonexpert. Includes P.R.B.'s 1981 World Population Data Sheet and thought-provoking questions.

48.* National Academy of Sciences and National Academy of Engineering. Study Committee on Environmental Aspects of a National Materials Policy. Man, Materials and Environment. Cambridge, MA.: M.I.T. Press, 1973. 236pp. $5.95

A broad team study covering the health effects associated with resource development; the economic implications of environmental quality and materials policy and the environmental effects of forest product, fuel, mineral and material development. Assesses methods for balancing social and economic needs with natural limiting factors. Calls for the creation of a population policy; the recognition that materials, energy, land and water are interdependent; and the expansion of research on the origins and effects of environmental deterioration.

49.* National Academy of Sciences. Office of the Foreign Secretary. Rapid Population Growth: Consequences and Policy Implications. (Vols. I and II) Baltimore, MD: Johns Hopkins Press, 1971. 696pp. o.p. Vol. I available in paperback. $5.00

An examination of the economic, resource, social, educational, health and political problems associated with rapid population growth. Volume I includes an overview of these problems as well as recommendations for action. Volume II contains more technical research papers.

50. Odell, Rice. "Supply-Side Ideas Challenge Old Population Theory," Conservation Foundation Letter, February, 1982. 8pp.

A good examination of recent challenges and debates concerning the theory that growing population pressures threaten environmental resources. Covers recent U.S. population trends and legislative proposals.

51. Odell, Rice. "Haiti: A Study of Environmental Destruction," Conservation Foundation Letter., Nov., 1977.

Discusses the severe human-caused problems of deforestation, overgrazing and erosion and their effect on the people of Haiti. The vicious cycle of population growth, land scarcity and misuse and poverty is clearly illustrated as are the political, social and economic obstacles to overcoming these problems.

52. Odell, Rice. "History Offers Some Warnings on Environment," Conservation Foundation Letter., Oct., 1977.

An examination of environmental problems in past civilizations. Attributes environmental decay to population pressures, inadequate soil conservation and water management policies, deforestation and climatic change.

53.* Odum, Eugene P. Fundamentals of Ecology. (3rd Edition) New York: Holt, Rinehart, Winston, 1971. 574pp. $27.95

Classic text on the principles of ecological systems with chapters on resources, pollution and population.

54.* Peterson, William. Population. New York: MacMillan, Inc., 1975 (3rd edition). 784pp. $21.95

Classic textbook on population, discussing demographic methods, Malthusian theory, forecasting and the population of various societal types.

55.* Real Estate Research Corporation for the Council on Environmental Quality, H.U.D. and E.P.A. The Costs of Sprawl: Environmental and Economic Costs of Alternative Residential Development Patterns at the Urban Fringe. Washington, D.C.: U.S.G.P.O., 1974. 278pp.

Assesses the environmental and economic effects of alternative development patterns at the urban fringe. Concludes that "sprawl" is the most expensive form of residential development in terms of economic and environmental impact, natural resource consumption and personal cost.

56. Reilly, William K. (ed.) The Use of Land: A Citizen's Policy Guide to Urban Growth. New York: Thomas Y. Crowell, 1973. 318pp. o.p.

The results of a study sponsored by the Rockefeller Brothers Fund which examines the compatibility of development with environmental, cultural and esthetic characteristics of land. Surveys major reports and legislation; presents data on attitudes toward growth in Colorado, Florida, California and New York. Detects a mood which questions traditional assumptions concerning the desirability of urban development; and recommends protecting open space and historic areas through better regulation and citizen involvement.

57. Ridker, Ronald G. and Elizabeth Cecelski. "Resources, Environment and Population: The Nature of Future Limits," Population Bulletin Vol. 34, No. 3 (Population Reference Bureau, Inc., Washington, D.C., 1979) 40pp.

A thoughtful examination of the interactions between population, resources and the environment with limited treatment of environmental factors. The authors contend that major problems are associated "less with physical exhaustion of resources than with their unequal distribution and the transition problems of moving from one resource regime to another in an orderly fashion."

58.* "Population and Pollution in the United States," Science 176, June 9, 1972. pp. 1085-1090.

Discusses the links between environmental pollution and population in a case scenario for the next 30 to 50 years. Theorizes that slowdown in the rate of population growth would give more time to find solutions to environmental and resource constraints.

59. Scientific American. The Human Population: A Scientific American Book. San Francisco: W.H. Freeman and Co., 1974. 147pp. $7.95

Reprint of the September, 1974, issue. Articles include the history of human population in general, food and population, the transfer of technology to underdeveloped countries and the populations of underdeveloped countries.

60. Scientific American. (with commentaries by Paul R. Ehrlich, John P. Holdren, and Richard W. Holm) Man and the Ecosphere. San Francisco: W. H. Freeman and Co., 1971. 307pp. o.p.

Twenty-seven articles, written between 1956 and 1971, which deal with various aspects of population, resources, environment and technology. Although dated, the articles give a good historical perspective on these issues.

61. Simon, Julian L. The Ultimate Resource. Princeton, N.J.: Princeton University Press, 1981. 415pp. $14.50.

Simon argues that population growth is beneficial from an economic viewpoint. He maintains that world resource shortages and environmental problems are solvable through better application of technology. A large portion of the text attacks what is, in the author's opinion, inaccurate data on world trends. Finally, Simon is skeptical of the role environmental and population organizations play in interpreting and disseminating data.

62. Simon, Julian L. "Global Confusion, 1980: A Hard Look at the Global 2000 Report," The Public Interest. 62, Winter, 1981. pp 3-20.

Criticizes the Global 2000 study. Claims it lacks historic perspective. Questions the validity of statements and projections. The author backs his assertions with seemingly accurate data on food, pollution, forests and population.

63. Simon, Julian L.. "False News Is Truly Bad News," The Public Interest. 65, Fall, 1981. pp. 80-89.

Simon's rebuttal of Katherine Gillman's article (see Gillman, "Julian Simon's Cracked Crystal Ball" annotation). Continues to claim that much of the Global 2000 Report data is too sketchy.

64. Simon, Julian L. "Letters," Science. 210 (4476) December 19, 1980. pp. 1296-1308.

Letters in response to Simon's claims that there is too much bad news in population, resources and the environment. (See below.) Simon responds with a justification of his original argument.

65. "Population, Resources, Environment: An Oversupply of False Bad News," Science. 208 (4451), June 27, 1980. pp. 1431-1437.

Statements of bad news in population, resources and environment are disputed. Analyzes the reasons for the appearance of this "false" news.

66. Smith, V. Kerry. Scarcity and Growth Reconsidered. (A Resources for the Future Book.) Baltimore: Johns Hopkins University Press, 1979. 298pp. $7.95

The results of a conference in which participants reconsidered the conclusions of the 1963 publication Scarcity and Growth: The Economics of Natural Resource Availability. (See Chandler and Morse annotation.) Experts with a wide range of views discussed such issues as measuring resource scarcity from economic and geological perspectives and modeling the role of natural resources in society.

67.* Tapinos, George and Phyllis T. Piotrow. Six Billion People: Demographic Dilemmas and World Politics. (1980s Project Council on Foreign Relations) New York: McGraw-Hill, 1978. 218pp. $5.95.

Reviews the success of fertility policies during the past 20 years and makes predictions concerning population size and structure and population-related policies that will occur during the next 20-year period. Critically examines current methods of demographic forecasting.

68.* Tuve, George L. Energy, Environment, Population and Food: Our Four Interdependent Crises. New York: John Wiley and Sons, 1976. 264pp. $29.95

Emphasizes the interdependence of food, population, environment and energy. Stresses the importance of taking all these factors into account when solving problems in the United States.

69. United Nations Economic and Social Council. Interrelationships Between Population, Resources, Environment and Development: Report of the Secretary-General., May 5, 1981. E/1981/65. 33pp.

A review of some of the private, public and UN-sponsored studies on population, resources and the environment.

70.* United Nations Educational, Scientific and Cultural Organization and U.N. Fund for Population Activities. Population-Environment Relations in Tropical Islands: The Case of Fiji. New York: UNIPUB, 1980. Order #U1054. 227pp. $18.00

A UNESCO/UNFPA pilot project describing research problems involved in the estimation of carrying capacities. Reports on environmental, population and resource problems in tropical islands and makes management recommendations.

71. van der Tak, Jean, Carl Haub, and Elaine Murphy, "Our Population Predicament: A New Look," Population Bulletin. Vol. 34, No. 5. (Population Reference Bureau, Inc., Washington, D.C., 1979) 48pp.

Reviews recent trends in world population growth with special emphasis on developing countries. Discusses projections for the time when world population stabilizes. Examines the impact of rapid population growth on economic development, employment, urbanization, public services, food supply, minerals, energy and the environment. Evaluates family planning programs. Concludes that greater family planning efforts, as well as changes in conservation practices and life-style, will be necessary to avert further stress, poverty and hunger.

72. Vogt, William. Road to Survival. New York: Sloane, 1948. 335pp. o.p.

An early description of the interactions between human activities and the global environment.

73. Ward, Barbara. Refer to nos. 36 and 37 above.

74. Weller, Robert H. and Leon F. Bouvier. Population: Demography and Policy. New York: St. Martin's Press, Inc., 1981. 365pp. $17.95

Intended for a student enrolled in basic demography, this comprehensive text covers population behavior from the perspective of the individual population actor. The text includes five sections on the study of population growth and distribution, the demographic variables of fertility, mortality and migration, the determinants and consequences of age and sex composition and population policy. Of particular interest are passages on population growth and food supply, energy and economic development.

74. Watt, Kenneth E.F. The Titanic Effect. New York: E.P. Dutton & Co. 1974. 268pp. o.p.

Presents "information about the important processes resulting from the interaction of economic, environmental and population phenomena" in an easily understandable form. Criticizes excessive and unplanned growth and explores the nature of the "titanic effect" -- the theory that "the magnitude of a disaster decreases to the extent that people believe it is possible and plan to prevent or minimize its effects."

SEE ALSO

Boserup, Ester. Population and Technological Change: A Study of Long-Term Trends (Development)

Brown, Lester R. Building a Sustainable Society (Policy Recommendations)

Council on Environmental Quality and Department of State. The Global 2000 Report to the President: Entering the Twenty-First Century (Reports, Modeling and Future Studies)

Independent Commission on International Development Issues (Brandt Commission) North-South: A Program for Survival (Reports, Modeling and Future Studies)

Jackson, Barbara (Ward) Progress for a Small Planet (Development)

Meadows, Donnella H., Dennis L. Meadows, Jorgen Randers, William W. Behrens III, The Limits to Growth (Reports, Modeling and Future Studies)

Murdock, William W. The Poverty of Nations: The Political Economy of Hunger and Population (Development)

Schumacher, E.F. Small Is Beautiful: Economics as if People Mattered (Development)

Science Council of Canada. Population, Technology and Resources (Policy Recommendations)

Scientific American. "Economic Development" (Development)

United Nations. The Population Debate: Dimensions and Perspectives (Development)

CONFERENCES

1. Benjamin, Bernard, Peter R. Cox and John Peel, eds. Resources and Population: Proceedings of the Ninth Annual Symposium of the Eugenics Society. New York: Academic Press, 1973. 181pp. $25.00

   A variety of statements made in 1972 about the relationships among water, energy, food and population.

2. Darling, F. Fraser and John P. Milton. Future Environments of North America. Garden City, N.Y.: Natural History Press, 1966. 767pp. o.p.

   Record of a conference convened by the Conservation Foundation in April, 1965, at Airlie House, Warrenton, Virginia. A collection of essays on the interaction of the plant and animal world with the environment, the developmental history of the United States regions, the influence of human activity on the environment and the need for regional planning and development.

3. Department of Economic and Social Affairs. United Nations. Interrelations: Resources, Environment, Population and Development. New York: United Nations, 1980. Sales No. E.80.11.A.8. 106pp. $6.00

   Proceedings of a United Nations symposium held in Stockholm. Its purpose was to "make use of the available knowledge on the interrelations between certain key variables and to demonstrate how this knowledge could be used in the formulation of national and international development strategies." Discusses carrying capacity, life-styles, resource use and human development and illustrates their interrelationships. Examines a decade of proceedings from major world conferences.

4. "Effects of Population Growth on Natural Resources and the Environment," Hearings before the Conservation and Natural Resources Subcommittee of the Committee on Government Operations. House of Representatives, 91st Congress, 1st Session. Washington, D.C.: U.S.G.P.O., September 15-16, 1969. 256 pp.

   Witnesses at the hearings include Dr. Preston E. Cloud, chairman of the Committee on Resources and Man for the National Academy of Sciences, Dr. Garrett Hardin and Dr. Kenneth E.F. Watt.

5. Feather, Frank, ed. Through the 80's: Thinking Globally, Acting Locally. Washington, D.C.: World Future Society 1980. 431pp. $12.50

   Prepared in conjunction with the First Global Conference on the Future held in Toronto, Canada, on July 20-24, 1980. Sixty short essays of differing views on various aspects of the future including resources, health, education, economics and communications.

6. "Global 2000 Report," Hearing before the Subcommittee on Census and Population of the Committee on Post Office and Civil Service. House of Representatives. 97th Congress, 1st Session. May 12, 1981. Washington, D.C.: U.S.G.P.O., 1981. 55pp.

   A one-day hearing addressing population problems and the Global 2000 Report. Speakers included Richard Ottinger (who earlier in the year had introduced a bill calling for the creation of a U.S. population policy), Ambassador Marshall Green and Lester Brown.

7. Grassheim, Elliott, Charles Cargille, eds. Key Issues in Population and Food Policy. Capon Springs Public Policy Conference #2, Washington, D.C.: University Press of America, Inc., 1978. 432pp. $15.75

   The proceedings of a conference sponsored by the Population/Food Fund in which population policy, world hunger and the population/food relationship were discussed.

8. Ignatius, Nancy, conference coordinator. Environment: The Global Connection Summary Report. Meridian House Conference, Meridian House, 1981. 65pp. o.p.

   A summary of a three-day conference designed for the District of Columbia's diplomatic community in 1980. Contains participants' major suggestions for solving the problems cited in both the Global 2000 Report and the Brandt Commission Report.

9. National Audubon Society. Policy Research Department. Conference Papers: Leadership Conference on Population, Resources and Environment. New York: National Audubon Society, 1981. 146+pp. $3.00

A collection of papers presented at the January, 1981, conference. Sixty population and environmental organizations sponsored the meeting which covered points raised in the Global 2000 Report, the World Conservation Strategy report and other documents. The conference gave the fledgling Global Tommorrow Coalition a valuable boost.

10. Singer, S. Fred ed. Is There an Optimum Level of Population? A Population Council Book. New York: McGraw-Hill, 1971. 440pp. o.p.

A collection of statements given in Boston at the annual meeting of the American Association for the Advancement of Science. Presents the concept of optimum population and its relationship to natural resources, environmental quality and human values.

11. Thomas, William L., Jr. Man's Role in Changing the Face of the Earth. An international symposium. Chicago, Illinois: University of Chicago Press, 1956. 1193pp. $7.95

A comprehensive, multidisciplinary, well-documented and frequently cited source exploring the question: "What has been and is happening to the Earth as a result of man's having been on it for a long time, increasing in numbers and skills unevenly, at different places and times?" The result of an international symposium with leading scholars in several fields, sponsored by the Wenner-Gren Foundation for Anthropological Research and held in Princeton, New Jersey, June 16, 1955.

12. United Nations. Report of the United Nations World Population Conference. Bucharest, August 19-30, 1974. New York: United Nations, 1975. Sales #E.75.XIII.3. 147pp. $8.50

A list of the conference's decisions, including the world population plan of action. Touches upon the relationships between population, resources and the environment.

SEE ALSO

United Nations. The Population Debate: Dimensions and Perspectives (Development)

DESERTIFICATION

Desertification, desert formation due to people pressure and land misuse, came to world attention during the Sahel (Southern Sahara) drought of the late 1960s and early 1970s. Some experts claimed that advancing sands helped cause the death of 100,000 people. Worldwide, people-caused deserts cover some five percent of the land surface, while another 19 percent is threatened. An estimated 80 million people live in these areas. Soil and vegetative impoverishment is usually caused by land mismanagement, population growth and corresponding increase in grazing, cultivation and uprooting of scrub and forest areas.

Although desertification has been associated primarily with Africa, Asia and the Middle East, it also has been occurring in the western United States on some 225 million acres -- roughly the size of the original 13 states. Major symptoms include long-term loss of native vegetation and high soil erosion rates, salinization of topsoil and water, reduction of surface waters and declining water tables.

Solutions range from the highly technical and expensive, (irrigation systems and desalinization plants), to the technologically simple but politically complex, (reallocation of water rights). People and governments in areas susceptible to desertification can prevent the occurrence of this process through long-term land-management policies, research and public education. Such recommendations were made at the United Nations Conference on Desertification.

DESERTIFICATION

1.* Council on Environmental Quality. (Written by David Sheridan) Desertification of the United States. Washington, D.C.: U.S.G.P.O., 1981. 142pp. $4.75

Reviews desertification problems in Texas, Arizona, California and eastern Colorado. Notes that, while desertification's impact on human life is not as severe as in lesser-developed countries where human populations are more directly dependent upon the land, it is still a significant environmental and economic problem. Offers such solutions as irrigation, development of drought and salt-resistant plants, cloud seeding and reallocation of water rights.

2.** Dregne, Harold ed. Arid Lands in Transition. Washington, D.C.: American Association for the Advancement of Science, 1970. 524pp. o.p.

A collection of papers given at the International Conference on Arid Lands in a Changing World (1969) at the University of Arizona.

3. Eckholm, Erik and Lester R. Brown. Spreading Deserts: The Hand of Man. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 13), 1977. 40pp. $2.00

Prepared at the request of the 1977 United Nations Conference on Desertification, this Worldwatch paper discusses the worldwide problem of desertification, population and food production in arid regions and possible social solutions to halt the desertification process.

4. Economic Geography 53 (4) 1977.

An entire issue devoted to the various aspects of desertification.

5.* Glantz, Michael ed. Desertification: Environmental Degradation In and Around Arid Lands. Boulder, CO.: Westview Press, 1977. 346pp. $29.75

A collection of essays about the physical, social and political aspects of desertificaton.

6.** Secretariat of the United Nations Conference on Desertification (Nairobi, Kenya, August 29 to September 9, 1977), ed. Desertification: Its Causes and Consequences. Elmsford, N.Y.: Pergamon Press, Inc. 448pp. $88.00

An overview of the desertification process. Extended studies cover desertification and its relationship with climate, ecological change, population and technology. Offers recommendations for action.

7.* United Nations. U.N. Conference on Desertification: Roundup, Plan of Action and Resolutions. New York: United Nations, 1978. 43pp.

Summary report of the conference which occurred in Nairobi, Kenya, from August 29 to September 9, 1977. Includes a plan of action developed by the participants.

SEE ALSO

Dasmann, Raymond F., John P. Milton and Peter H. Freeman. Ecological Principles for Economic Development. (Deforestation)

DEFORESTATION

Tropical deforestation is occurring worldwide at a rate of one to two percent a year -- a loss roughly the size of West Virginia. Tropical country populations are currently around two billion and are expected to grow to three billion by the year 2000, putting greater pressure on forests.

Rain forests are the habitat for a large part of the world's wildlife. They provide food, fiber, fodder, fuel, building material and medicines. Tropical ecosystems stabilize soils and regulate water flow. They are also thought to store a major part of the carbon in the earth's biomass and thereby indirectly affect the carbon dioxide content of the atmosphere and ultimately, the world's climate.

Deforestation is indirectly aided by the growing presence of people, rising demand and inequalities in land tenure. Direct causes include poorly managed logging practices and intensified agricultural practices. Increased fuel wood gathering and farming customs, which used to be benign (slash and burn, for example), are now harmful because they are employed more often by more people. Large areas of cut forest are devoted to cash or "export" crops. Additionally, cattle ranching and grazing fields have expanded markedly because of inexpensive production costs.

Deforestation diminishes species diversity and actual and potential medical and agricultural benefits. It disrupts watersheds and causes erosion, siltation and flooding. It forces increased dependence on imported forest products and a shift to burning dung needed for maintaining fertile soil. These changes can cause people to migrate, sink further into poverty or become politically volatile.

Immmediate measures to halt deforestation include better management; creation and maintenance of reserves; further research, education and training; integration of environmental concepts into development strategies; reforestation and agro-forestry. Longer-term remedies include population control and redistribution; a redefinition of economics to include the real value of tropical forest and species diversity; a questioning of the traditional need for growth in consumption; long-range local, national and international legal and political acts for preserving forests and continuous public education.

DEFORESTATION

1. Dasmann, Raymond F., John P. Milton and Peter H. Freeman. Ecological Principles for Economic Development. New York: John Wiley and Sons, 1973. 252pp. $22.95

   Explores several ecological concepts which have been practical and effective. Offers case studies associated with tropical forestry and development in arid regions.

2. Eckholm, Erik. Planting for the Future: Forestry for Human Needs. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 21), 1979. 64pp. $2.00

   Views the forest product needs of the world's population and assesses trends in deforestation. Concludes by reviewing some successful reforestation programs.

3. Eckholm, Erik. Disappearing Species: The Social Challenge. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 22), 1978. 32pp. $2.00

   Discusses the economic and social causes for the disappearance of many species in tropical moist forest regions. Explains the consequences of this trend.

4.* Ehrlich, Paul R. and Anne R. Ehrlich. Extinction: The Causes and Consequences of the Disappearance of Species. New York: Random House, 1981. 305pp. $15.95

   Explains the economic, medical, ethical, biological and physical reasons why endangered species should be saved. Examines direct causes such as over-exploitation as well as indirect causes such as habitat destruction due to urbanization, agriculture, deforestation, overgrazing, overspraying of pesticides, industrial pollution and strip mining that contribute to species extinction. Covers current efforts to save species, including political proposals and zoo and reserve protection. Offers a brief strategy for species conservation that includes population control and a transformation of the growth-oriented economic system to a steady state system.

5.* Gomez-Pompa, A., C. Vazquez-Yanes, S. Guevara. "The Tropical Rain Forest: A Non-renewable Resource," Science. 177, (4051) September 1, 1972. pp. 762-65

Argues that tropical rain forests should be preserved. Emphasizes that most tropical forests are unable to regenerate due to present land-use practices.

6.** Meggers, Betty J., Edward S. Ayensu, and W. Donald Duckworth eds. Tropical Forest Ecosystems in Africa and South America: A Comparative Review. Washington, D.C.: Smithsonian Institution Press, 1973. 350pp. o.p.

Covers the various physical, biological and ecological aspects of tropical forests in Africa and South America with papers on the ecological effects of human activities in the Amazon region and tropical forest land use.

7.* Myers, Norman. Conversion of Moist Tropical Forests. Washington, D.C.: National Research Council of the National Academy of Sciences, 1980. 205pp. $13.50

Discusses the impact of slash and burn farming, timber trading and cattle raising on tropical forests.

8. Myers, Norman. The Sinking Ark. Elmsford, N.Y.: Pergamon Press, 1979. 307pp. $9.95.

Discusses the economic consequences of the increasingly rapid disappearance of species throughout the world. Explains the human-related causes of this disappearance and examines the special case of tropical moist forests, where much of the loss is occurring. Proposes a comprehensive strategy for conservation of species with emphasis on a collective global approach.

9.* National Research Council. Committee on Genetic Vulnerability of Major Crops. Genetic Vulnerability of Major Crops. Washington, D.C.: National Academy of Sciences, 1972. 307pp. o.p.

Examines the history and nature of crop epidemics and the vulnerability of genetically uniform crops. Makes recommendations to prevent future crop failures.

10.** U.N. Educational, Scientific and Cultural Organization; U.N. Environment Program and Food and Agricultural Organization. Tropical Forest Ecosystems: A State of the Knowledge Report. Vendome, France: UNESCO/UNEP, 1978. 683pp. Available through UNIPUB, New York. Order #U874. $67.25

Included are sections describing the evolution and function of tropical rain forests, human impact and patterns of use and regional case studies.

11.* U.S. Department of State and Agency for International /Development (Douglas R. Shane, principal editor) U.S. Strategy Conference on Tropical Deforestation. Washington, D.C.: U.S.G.P.O., 1978. 78pp.

The proceedings of a June, 1978, conference which sought to expand U.S. awareness of tropical forest management problems, encourage dialogue, and define more responsive policies. Recommends further research on deforestation.

12.* U.S. Forest Service, Forest Products Laboratory. Forestry Activities and Deforestation Problems in Developing Countries. Washington, D.C.: U.S.G.P.O., 1980. 194pp.

Surveys the ecological effects of various forestry agencies that assist developing countries. Offers a series of recommendations to limit the environmental impact of forest projects.

13. U.S. Interagency Task Force on Tropical Forests. The World's Tropical Forests: A Policy, Strategy and Program. Washington, D.C.: U.S.G.P.O., 1980. Stock #044-000-01769-5. 53pp. $4.00

Assesses some of the social, economic and environmental costs of deforestation in developing countries. Explains why the United States is interested in tropical forests. Recommends policy, strategy and programs to assist federal institutions with the design, justification and implementation of future activities in the forestry field.

14.* World Bank. Forestry Sector Policy Paper. Washington, D.C.: World Bank, 1978. 65pp. $5.00

Stresses the importance of forests to man and the environment. Describes the World Bank's role in forestry and points out its future need to emphasize the environmental consequences of its activities.

SEE ALSO

Allen, Robert. How to Save the World: Strategy for World Conservation (Policy Recommendations)

Bolin, B. "Changes of Land Biota and Their Importance for the Carbon Cycle" (Climate)

Eckholm, Erik. The Other Energy Crisis: Firewood (Energy)

Farvar, M. Taghi and John P. Milton eds. The Careless Technology: Ecology and International Development (Development)

International Union for Conservation of Nature and Natural Resources, with advice and cooperation from the United Nations Environment Program and World Wildlife Fund. World Conservation Strategy: Living Resources for Sustainable Development (Policy Recommendations)

Odell, Rice. "History Offers Some Warnings on Environment" (General)

Odell, Rice. "Haiti: A study in Environmental Destruction" (General)

Woodwell, George M. "The Carbon Dioxide Question" (Climate)

ENERGY

During the 1973 energy crisis, people became aware of their dependence on global energy production and distribution, but by that time fossil fuel had been thoroughly incorporated into economics, agriculture, transportation and shelter. Only with price rises and the later Iranian cutoff did the United States begin to wean itself from foreign oil.

Although energy problems have always existed, they were not as deep, complex, interdependent and far reaching as they are now. Two examples illustrate this. It was recently estimated that energy supplies would have to rise by 17 percent over the next two decades to keep per capita consumption the same just because of population growth in the United States (see Davis). There is also a clear connection between energy prices and food prices (Pimentel).

Knowledge of the environmental and social side-effects of advanced and capital-intensive technologies is especially important to developed countries. Dependence on massive, centralized "hard" energy systems can lead to less freedom, more governmental control and greater risk of system failure. Production, transport and consumption have side-effects such as strip-mining scars, oil spills, air pollution and radioactive waste.

Alternatives to "hard" energy have bee[illegible]d are being developed which include conservation, solar power and other renewable resources, but further research, market forces, citizen choice, governmental programs and capital investment will determine the precise mix of future supplies. Some technological optimists endorse nuclear fusion, coal and oil shale. Environmentalists favor wind, sun and water. A mix of these forces may prove desirable in the long run, both environmentally and economically.

1.** Ashley, Holt et al. eds. Energy and the Environment: A Risk Benefit Approach. Elmsford, New York: Pergamon Press, 1976. 305pp. $26.00

Discusses the health effects of energy and energy systems as they relate to human welfare and the environment. Based on nine seminars given by the Institute of Energy Studies at Stanford and the Electric Power Research Institute during Autumn, 1974.

2.* Cook, Earl. Man, Energy, Society. San Francisco: W. H. Freeman and Co., 1976. 478pp. $11.95

A geographic view of energy and its incorporation into society. Reviews historic energy use and contemporary energy problems and discusses alternative energy futures.

3.* Cottrell, Fred. Energy and Society: The Relation Between Energy, Social Change and Economic Development. New York: McGraw-Hill, 1955. 330pp. o.p. Reprinted in 1970 by Greenwood Press, Westport, CT. $21.95

Documents the historic influence of energy availability in various cultures.

4. Davis, Kingsley. "It Is People Who Use Energy," Science (211) 4481. Jan. 30, 1981.

Briefly examines the influence of population growth on energy consumption. Concludes that population control should become part of the solution to the energy problem.

5. Eckholm, Erik. The Other Energy Crisis: Firewood. Washington, D.C.: Worldwatch Institute, 1975. (Worldwatch Paper 1) 22pp. $2.00

Examines how a large proportion of the world's population is dependent upon firewood. Points out that population growth and unsound management practices are causing a scarcity of fuel wood as well as severe environmental problems in developing countries. These problems are difficult to overcome due to political, administrative and cultural obstacles.

6. Hayes, Denis. Rays of Hope: The Transition to a Post-Petroleum World. W.W. Norton and Co., 1977. 240pp. $4.95

Describes the decline of oil-based societies and the possibilities of a conservation-oriented society.

7.** Holdren, John P. "Fusion Energy in Context: Its Fitness for the Long Run," Science 200 (4338) April 14, 1978. pp. 168-80

Discusses the practicalities involved in implementing long-term energy solutions. Among the elements for consideration are the long lead time for installation of energy systems and the environmental effects and compatibility of such systems. Evaluates the prospects of fusion in terms of these criteria.

8.* Holdren, John P. "Energy and Prosperity: Some Elements of a Global Perspective," Bulletin of Atomic Scientists 31 (1), January 1975, pp. 26-28.

Predicts that the gap between rich and poor countries will increase in terms of energy use. Urges limiting population growth in all countries, slowing down per capita energy consumption in developed countries and accelerating per capita energy use in less-developed countries. Advocates further research and offers new policies for achieving these goals.

9.** Hollander, Jack M., Melvin K. Simmons and David Wood eds. Annual Review of Energy. Palo Alto, CA.: Annual Reviews, Inc. Annual since 1976. 440pp. (1980) $20.00

A series of papers about the energy situation in various countries and regions. Covers the environmental, social and political aspects of energy; energy supply, demand, technology and conservation; and the global aspects of the present situation.

10.* Kendall, Henry W. and Steven J. Nadis eds. Energy Strategies: Toward a Solar Future. A report of the Union of Concerned Scientists. Cambridge, MA.: Ballinger Publishing Company, 1980. 320pp. $19.50

A thoughtful assessment of the current U.S. energy system and its future needs. Offers a plan that would use existing technology, such as conservation and solar energy, to meet energy needs without increasing conventional fossil fuel supplies. Treats the environmental aspects of conventional and renewable systems, and includes a discussion of population growth and its relationship to future energy needs.

11.* Lovins, Amory B. Soft Energy Paths: Toward a Durable Peace. New York: Harper and Row, 1977. 231pp. $4.95

A well-written, well-documented argument for the adoption of "soft" energy technology. Analyzes the flow of energy in contemporary society. Notes the increasing world interdependence with current "hard" technologies.

12.* National Audubon Society The Audubon Energy Plan: A Technical Report. New York: National Audubon Society, April, 1981. 92pp. free

This plan demonstrates that the United States economy can grow and keep pace with population demands without consuming more energy. This goal can be achieved through conservation, improved efficiency and the use of existing renewable technologies. The plan proposes that solar renewables comprise 25 percent of the total energy budget by the year 2000, estimates the capital costs required to establish such a program and recommends an effort which combines market forces, regulation and education.

13. Odum, Howard T. and Elisabeth C. Odum. Energy Basis for Man and Nature. New York: McGraw-Hill Inc., 1976. 296pp. $12.95

Follows the flow of energy through individuals, populations and natural and man-made systems with helpful diagrams.

14.* Odum, Howard T. Energy, Power and Society. New York, New York: Wiley Interscience, 1971. 331pp. $12.00

A detailed analysis of energy flow through various systems, much like the author's later work, Energy Basis for Man and Nature.

15.* O'Toole, James and the University of Southern California Center for Futures Research. Energy and Social Change. Cambridge, MA.: MIT Press, 1976. 185pp. $4.95

Studies the near- and long-term energy situation. Optimistically forecasts how society can change and cope with energy problems within its current framework.

16.* Ross, Marc H. and Robert H. Williams. Our Energy: Regaining Control - A Strategy for Economic Revival Through Redesign in Energy Use. New York: McGraw-Hill, 1981. 354pp. $17.95

A well-written description of how American society can regain control of its energy system through increased energy efficiency.

17. Scientific American. Energy and Power. San Francisco: W.H. Freeman, 1971. 144pp. $8.95

Reprint of the September, 1971, issue. Includes general articles about Earth's energy resources and the environmental and social effects of its exploitation. Other articles follow the flow of energy through the biosphere and examine Eskimo hunting, New Guinea agricultural and modern industrial societies. Although dated, this issue provides historical perspective and contains useful, illustrated information about the principles of energy production and use.

18.** Steinhart, John and Carol Steinhart. "Energy in the U.S. Food System," Science 184 (4134) April 19, 1974. pp. 307-315

Examines the use of energy in the United States food system.

19.* Stobaugh, Robert and Daniel Yergin eds. Energy Future: Report of the Energy Project at the Harvard Business School. New York: Random House, 1979. 353pp. $3.70

Views the continued supply of oil, coal, nuclear and natural gas as uncertain due to environmental, economic, political and safety questions. Endorses unconventional sources of energy and urges their adoption through more consistent framework of prices, incentive and regulation.

SEE ALSO

Council on Environmental Quality. Global Energy Futures and the Carbon Dioxide Problem (Climate)

Makhijani, Arjun and Alan Poole. Energy and Agriculture in the Third World: A Report to the Energy Policy Project of the Ford Foundation (Food and Agriculture)

National Research Council. Geophysics Study Committee. Energy and Climate (Climate)

Pimentel, David, William Dritschillo, John Krummel, John Kutzman. "Energy and Land Constraints in Food Protein Production" (Food and Agriculture)

Pimentel, David and Marcia Pimentel. Food, Energy and Society (Food and Agriculture)

Pimentel, David et al. "Food Production and the Energy Crisis" (Food and Agriculture)

Pimentel, David et al. "Land Degradation: Effects on Food and Energy Resources" (Food and Agriculture)

Woodell, George M. "The Carbon Dioxide Question" (Climate)

Since Malthus, the relationship between population and growth in food supplies has been much debated, and thus far, Malthus appears to be wrong.

There has been a tremendous transformation of agriculture since 1798. Technological developments, plus the Green Revolution, have produced exponential growth in food production. But along with that increase came faster world population growth. Unfortunately, while there have been significant gains in global per capita food production (with the exception of Africa), the percentage increase has fallen yearly since the beginning of the 1970s.

Green Revolution tilling is more dependent on pesticides, chemical fertilizers, fossil fuels and irrigation; monoculture crops and crops with little genetic variability. Chemical additives have caused or intensified numerous environmental and social problems. Monocultures are susceptible to pests and plant viruses. Pesticides harm wildlife and humans. Fertilizers enter the water system and increase pollution. Intensive farming increases erosion.

The Green Revolution also has had social effects. Increased use of farm machinery reduces need for labor. Age-old problems of land distribution and the introduction of cash or export crops by multinational corporations or governments have reduced the ability of people in less-developed countries to become self-sufficient. Cash crops crowd the best land, leaving poor soil for local populations.

While several experts calculate there is enough food worldwide to feed everyone adequately, people are starving. There is inadequate infrastructure to distribute the food. Thus far, government programs and policies have failed to address fully the range of problems.

FOOD AND AGRICULTURE

1.* Abelson, Philip H. ed. Food: Politics, Economics, Nutrition and Research. Washington, D.C.: American Association for the Advancement of Science, 1975. 202pp. $10.00

A series of articles on food, many of which appeared in a May 9, 1975, issue of Science. Discusses economics, politics and agricultural research.

2.** Allaby, Michael. World Food Resources: Actual and Potential. London: Applied Science Publishers, Ltd., 1977. 418pp. $28.00.

A historical approach to food production discussing the impact of the Green Revolution, population growth and food demand, the influence of weather and climate on food production and the resources currently available for food production. Concludes that most food problems are caused by political, social and economic factors rather than technological restraints. Reviews a variety of food theories and explores future scenarios.

3. Brewer, Michael "The Changing U.S. Farmland Scene," Population Bulletin vol. 36, No. 5 (Population Reference Bureau Inc. Washington, D.C., 1981) 40pp.

A thoughtful future-oriented reexamination of recent trends in U.S. agricultural land. Trends include the conversion of agricultural land to residential and industrial use, increased competition for water and pressure from foreign grain exports. Disputes statistical data collection techniques and their pessimistic interpretation. Concludes that the agricultural system can adjust to meet demands beyond the year 2000.

4.* Brink, R.A. "Soil Deterioration and the Growing Demand for World Food," Science 197 (4304) August 12, 1977. pp. 625-30

Looks at the soil deterioration problem that is occurring in Wisconsin under the impact of modern agricultural technology and the growing world demand for U.S. agricultural products. Reviews responses and recommends action on the problem of soil deterioration.

5. Brown, Lester R. The Worldwide Loss of Cropland. Washington, D.C.: Worldwatch Institute (Worldwatch paper 24) October, 1978. 48pp. $2.00

   Cropland deterioration and human population growth are examined in this Worldwatch paper. Although more widespread information on trends in soil erosion and deterioration has become available in recent years, most people and their governments still take their cropland for granted.

6. Carter, Luther J., "Soil Erosion: The Problem Persists Despite the Billions Spent on It," Science 196 (4288) April 22, 1977. pp. 409-411.

   Discusses the conflict between soil conservation and maximization of short-term crop yields as well as the failure of some soil conservation programs.

7. Dale, Tom and Vernon Gill Carter. Topsoil and Civilization. Norman, Oklahoma: University of Oklahoma Press, 1955. 275pp. $6.95

   Analyzes world history from the point of view of man's relation to productive soil. Discusses soil conservation problems in the United States.

8. Eckholm, Erik P. Losing Ground: Environmental Stress and World Food Prospects. New York: W.W. Norton, 1976. 223pp. $5.95

   This frequently cited source surveys and analyzes the human-caused environmental deterioration of food- and fuel-producing lands throughout the world.

9. Farb, Peter and George Armelagos. "The Food Connection," Natural History 89 (9) September, 1980. pp. 26-30

   A historical survey linking increase in population to the introduction of new foods.

10. Fletcher, W. Wendell and Charles E. Little. The American Cropland Crisis. Bethesda, MD: American Land Forum, 1982. 193pp. $7.95.

A definitive book about farmland conversion written by two former Library of Congress researchers. Reviews some recent material, including the National Agricultural Lands Study (see annotation). Follows reaction to conversion through regulations and political moves made during the past 20 years. Views American agriculture in a broad, global context. Suggests that technological and natural constraints will affect productivity. Offers creative new ideas for preserving land, including successful case studies made in California, Canada, France, Pennsylvania, private land trusts and conservancies.

11.* Jensen, Neal. "Limits to Growth in World Food Production," Science 201 (4353) July 28, 1978. pp. 317-320

Theorizes that a natural yield ceiling may impose a limit on future productivity and growth.

12.* Lappe, Frances Moore and Joseph Collins. Food First. Boston: Houghton Mifflin Co., 1977. 466pp. $11.95

Claims that the adoption of Western economic systems by developing countries causes further food shortages. Also claims that land and food scarcities are not the causes of hunger. Interesting perspective.

13.* Makhijani, Arjun and Alan Poole. Energy and Agriculture in the Third World: A Report to the Energy Policy Project of the Ford Foundation. Cambridge, MA.: Ballinger, 1975. 168pp. o.p.

A thorough analysis of energy use for agriculture in the Third World. Presents a series of case studies and discusses fuel sources.

14. National Agricultural Lands Study. Final Report. (and accompanying reports) Washington, D.C.: U.S.G.P.O., 1981. 108pp. $14.00

Sponsored by the U.S. Department of Agriculture and the President's Council on Environmental Quality, this study investigates the current status of agricultural land, including such issues as competition and protection efforts. Recommendations emphasize the important role of state and local governments. Accompanying reports include a citizen's guidebook to zoning protection, a summary for state and local governments, a pamphlet entitled "Where Have the Farmlands Gone?" and an annotated bibliography.

15.* National Research Council. Commission on International Relations. Supporting Papers: World Food and Nutrition Study. (Vol. III). Washington, D.C.: National Academy of Sciences, 1977. 340pp. $8.00

A study dealing with the interdependence of food, population, health, energy and the environment (see especially pages 240-54 for an overview).

16. National Research Council. Committee on World Food, Health and Population. Population and Food: Crucial Issues. Washington, D.C.: National Academy of Sciences, 1975. 50pp. o.p.

Reviews global trends in population and food production. Recommends ensuring continued agricultural success while bringing population under control.

17. Odell, Rice. "Food Resources Threatened by Mismanagement," Conservation Foundation Letter September, 1980.

Discusses the human consequences of the environmental and political mismanagement of the world's agricultural resources. Proposes reforms and remedies.

18.* Pimentel, David ed. World Food, Pest Losses and the Environment. Boulder, CO.: Westview Press, 1978. 206pp. $24.25

A collection of papers presented at the symposium on "World Food, Pest Losses and the Environment" held at the American Association for the Advancement of Science meeting in Denver, Colorado, February, 1977. Explores various aspects of the interdependencies between population, food production and storage, pest and disease control and the environment.

19.* Pimentel, David and Marcia Pimentel. Food, Energy and Society. London: Edward Arnold Ltd, 1979. 165pp.

Explores the historical interdependence of food production, energy and its impact on society.

20.* Pimentel, David et al. "Land Degradation: Effects on Food and Energy Resources," Science 194 (4261) October 8, 1976. pp. 149-55.

Evaluates the relationship of cropland degradation to food production and energy conservation. Analyzes patterns of arable land loss in the United States, environmental consequences of cropland deterioration, alternatives for the conservation and protection of arable lands and economic effects of erosion and conservation. Concludes that it is vital to preserve U.S. land resources because of severe environmental and population problems in other countries.

21.* Pimentel, David, et. al. "Energy and Land Constraints in Food Protein Production," Science 190 November 21, 1975. pp. 754-761.

Analyzes the energy and land demands for animal and vegetable protein production in the United States in terms of a global context. Concludes that available farmland and energy supplies cannot feed the world population of four billion people in the manner to which Americans are accustomed. Predicts that land degradation and shortages of food, energy and water will accompany increased population. Advises greater consumption of vegetable proteins, careful management of resources and population control.

22.* Pimentel, David et al. "Food Production and the Energy Crisis," Science 182 (4111) November 2, 1973. pp. 443-449

Measures the energy required to produce corn, examines the needs of a food supply dependent on energy-intensive agriculture and considers alternatives to reduce energy use in food production.

23.* Rosenberry, Paul, Russell Knutson and Lacy Harman. "Predicting the Effects of Soil Depletion from Erosion," Journal of Soil and Water Conservation 35 (4) May-June, 1980. pp. 131-134.

Predicts the effect of soil erosion on soil productivity and production costs in the year 2020 by using data from the Southern Iowa Conservancy District. Finds that the cost of reducing soil erosion to tolerable levels would be three times as expensive as the benefits. Notes the importance of crop residue as an economically feasible alternative for controlling erosion.

24. Sampson, Neil. Farmland or Wasteland: A Time to Choose. Emmaus, PA.: Rodale Press, 1981. 422pp. $16.95

Views the current stresses on American farmland holistically. Discusses past conservation efforts, population growth, the expansion of world markets, soil erosion and degradation and conversion of farmland. Projects today's trends into the future and offers a program of conservation and citizen action to ensure adequate farmland for future needs.

25. Scientific American. Food and Agriculture. San Francisco: W.H. Freeman, 1976. 154pp. $9.95

Reprint of the September, 1976, issue of Scientific American. Articles about hunger, nutrition, future agricultural resources and agricultural advancement in developing countries express an optimistic viewpoint.

26. U.S. Presidential Commission on World Hunger. Overcoming World Hunger: The Challenge Ahead. Washington, D.C.: U.S.G.P.O., 1980. 251pp. $2.50

Examines the causes, dimensions and possible solutions to the world hunger problem. Recommends that to safeguard aspects of our national security it is necessary to help overcome problems of world hunger and that the elimination of hunger should be made the primary focus of our relationships with developing nations.

27.** Woods, Richard G. ed. Future Dimensions of World Food and Population. Boulder, CO.: Westview Press, 1981. 413pp. $25.00

A collection of papers written by experts who participated in the Congressional Roundtable on World Food and Population during 1979-80. Sections include: the global problem of balancing population and food, potential sources of food, the process of agricultural development and world food and American national security.

28.* Wortman, Sterling and Ralph W. Cummings, Jr. To Feed This World: The Challenge and the Strategy. Baltimore, MD.: Johns Hopkins University Press, 1978. 440pp.

Discusses the problems caused by increased food production in developing areas. Claims that new food production capabilities will come into existence if governments act. Includes a history of U.S. and world recognition of food and hunger problems in the 60s.

SEE ALSO

Biswas, Margaret R. and Asit K. Biswas eds. Food, Climate and Man (Climate)

Brown, Lester. The Twenty-Ninth Day: Accommodating Human Needs and Numbers to the Earth's Resources (General)

Eckholm, Erik. The Dispossessed of the Earth: Land Reform and Sustainable Development (General)

Eckholm, Erik and Lester Brown. Spreading Deserts: The Hand of Man (Desertification)

Glantz, Michael. Desertification: Environmental Degradation in and around Arid Lands (Desertification)

Murdock, William W. The Poverty of Nations: The Political Economy of Hunger and Population (Development)

Odell, Rice. "Haiti: A Study in Environmental Destruction" (General)

Odell, Rice. "History Offers Some Warnings on Environment" (General)

Steinhart, John and Carol Steinhart. "Energy in the U.S. Food System" (Energy)

Thompson, L.M. "Weather Variability, Climatic Change and Grain Production" (Climate)

Wittwer, Sylvan H. "Carbon Dioxide and Climatic Change: An Agricultural Perspective" (Climate)

CLIMATE

Climatologists agree that human-induced weather change may be occurring now or in the near future with far-reaching effects on people and other living organisms. Although great climatic shifts have happened naturally throughout Earth's existence, intensified human activities now present a serious threat, particularly with our dependence on fossil fuels and the consequent rise in atmospheric carbon dioxide. A doubling of this gas in the atmosphere would create a greenhouse effect -- a warming of the climate from trapping the Earth's heat.

Scientists are becoming more informed about the relationship between carbon dioxide and climate change through constructing theoretical models, but it is still uncertain exactly how a shift would affect global biomass and ecosystems, agriculture, sea levels, energy demand and supply, water, fisheries and prevalence of disease. Perhaps the worst impact would be a rising ocean from melting polar ice. In the United States alone a five-meter rise of the sea could affect more than 11 million Americans, and in Florida about 40 percent of the population would have to move.

CLIMATE

1.* Biswas, Margaret R. and Asit K. Biswas eds. Food, Climate and Man. New York: John Wiley and Sons, 1979. 285pp. $31.95

A collection of essays on the interrelated nature of climate, agriculture, energy, food, environment, water and economic development.

2.* Bolin, B. "Changes of Land Biota and Their Importance for the Carbon Cycle," Science 96 (4290) May 6, 1977 pp. 613-615

Attributes part of the increase of carbon dioxide in the atmosphere to the expansion of forestry and agriculture.

3. Bryson, R.A. and Thomas J. Murray. Climates of Hunger. Madison, WI.: University of Wisconsin Press, 1977. 171pp. $6.95.

Connects certain events in human history with sudden climate change. Supports claims that the Mycenae (Greek) and some North American Indian civilizations declined or dispersed because of climatological change. Examines the record and causes of climate change during the past 1000 years.

4.* Bryson, R.A. "A Perspective on Climatic Change," Science 184 (4138), May 17, 1974. pp. 753-759

Discusses the potentially significant impact of small climate changes, reviews their causes and implies that human activities influence climate.

5. Council on Environmental Quality. Global Energy Futures and the Carbon Dioxide Problem. Washington, D.C.: U.S.G.P.O., 1981. 92pp. $4.00.

Summarizes the carbon dioxide issue for a nontechnical audience. Analyzes the relationship between carbon dioxide buildup and energy policies here and abroad. Explores the possible effects of climatic change on precipitation, agricultural potential, sea levels, fisheries and socioeconomic systems. Makes recommendations for further action.

6.* Hansen, J. et al. "Climate Impact of Increasing Atmospheric Carbon Dioxide," Science 213 (4511) August 28, 1981. pp. 957-966.

Suggests that the temperature increase apparent during the past 15 years is related to the "greenhouse effect" which is caused by increasing levels of carbon dioxide. Predicts that the 1980s may see a global warming due to further increases in carbon dioxide generated by fossil fuels. Explores potential effects of this warming, including more drought zones, melting of the Antarctic ice sheet and rising sea levels. Recommends further research and changes in energy policies.

7. Kellogg, William and Robert Schware. Climate Change and Society: Consequences of Increasing Atmospheric Carbon Dioxide. Boulder, CO.: Westview Press, 1981. 178pp. $8.00

Explores the possible effects of a changing climate on such areas as ecosystems, water resources, food production, energy demand, health and disease and population settlements. Discusses the necessity of planning to avert change or mitigate its effects.

8.** National Research Council. Committee for the Global Atmospheric Research Program. Understanding Climatic Change: A Program for Action. Washington, D.C. : National Academy of Sciences, 1975. 239pp. $9.00

Discusses the physical basis of climate and climate change, past variations, current projections and research programs.

9.** National Research Council. Geophysics Study Committee. Energy and Climate. Washington, D.C.: National Academy of Sciences, 1977. 158pp. o.p.

A technical volume about the impact of energy production and use on climate. Explores the possible effects of climatic change.

10.* Sagan, Carl, Owen B. Toon and James B. Pollack. "Anthropogenic Albedo Changes and the Earth's Climate," Science 206 (4425) December 21, 1979. pp. 1363-1367.

The use of physical models suggests that a connection exists between man's alteration of the Earth's surface and climatic change.

11. Schneider, Stephen H. The Genesis Strategy. New York: Plenum Press, 1976. 419pp. $17.50

Discusses both natural and man-induced climate changes. Examines historical climate patterns, the connection between climate change and energy use and food, and alternative options available to provide a hedge against sudden and possibly catastrophic climatic change.

12.** Singer, S.F. ed. The Changing Global Environment. Dordrecht, Netherlands: W. Reidel Publishing Co., 1975, 423pp.

A series of essays which review the changing global environment with emphasis on the effects of man's activities on the atmosphere, the climate and the oceans.

13.* Study of Man's Impact on Climate. Inadvertent Climate Modification. Cambridge, MA.: the MIT Press, 1971. 308pp. o.p.

A report which was the result of a three-week gathering of 30 of the world's leading scientists, hosted by the Royal Swedish Academy of Sciences and the Royal Swedish Academy of Engineering Sciences and sponsored by the Massachusetts Institute of Technology. Covers the fundamentals of historical and present climate change, general climatic theory and modeling and the effects of man's activities on the climate. Recommends further areas for study.

14.* Thompson, L.M. "Weather Variability, Climatic Change and Grain Production," Science 188 (4188) May 9, 1975. pp. 535-541.

Studies the potential effect of a world cooling trend on food production. Concludes that weather variability will have a greater effect, particularly on grain production.

15. Wittwer, Sylvan H. "Carbon Dioxide and Climatic Change: An Agricultural Perspective," Journal of Soil and Water Conservation 35 (3) May-June, 1980. pp. 116-120

Contrary to many reports, this article suggests that an increase in carbon dioxide may be biologically beneficial to agriculture because it increases photosynthetic efficiency and positively influences growth processes.

16. Woodwell, George M. "The Carbon Dioxide Question," Scientific American 238 (1) January, 1978. pp. 34-43.

Links the use of fossil fuels and the worldwide destruction of forests to an increase in atmospheric carbon dioxide.

DEVELOPMENT

Development seeks to alleviate poverty and improve human potential. Philosophies on how to reach these goals, as well as theories on the causes and consequences of impoverishment, have changed radically during the past 20 years as programs failed (or succeeded) and as world economic and political orders and perceptions shifted.

Rapid population growth, unequal land distribution, poor education, lack of capital and the current structure of social and political systems are cited among the causes of poverty. Immediate consequences include malnutrition and poor health plus a vicious cycle of environmental degradation from farming marginal lands, exploiting scarce wood fuel supplies, political instability and high birth rates.

Post-World War II development efforts have been flawed. They were based on massive infusion of capital and complex technology, on land redistribution and education. These methods were applied too fast and often disrupted stable social and economic systems. In some cases they were totally ineffective in improving people's lives.

A classic example was the Aswan high dam and formation of Lake Nasser in Egypt. While the lake provided hydro-electricity, irrigation and more arable cropland, it disrupted long-held settlement patterns, caused a vast increase of the water-borne disease, schistosomiasis, and cut off fertile river silt from farms downstream which forced dependence on expensive fertilizer. Meanwhile, Egypt's population growth during the dam construction erased any real progress in achieving an increase in per capita food production.

Ideas of how to go about development began to change during the late 1960s and the early 1970s. Some of these were expressed at the U.N. Conference on the Human Environment (1972) and at the U.N. World Population Conference (1974).

The new view of development is more holistic, more environmentally sound and better accounts for traditional social, economic, religious and cultural needs. Called "sustainable development," it recognizes linkages between population, resources and environment and integrates them into family planning, agriculture, health, nutrition, education and land distribution reform. "Sustainable development" stresses the role of women, and it emphasizes the use of a less complex and more locally effective technology that can be understood and operated by local people.

DEVELOPMENT

1. Birdsall, Nancy M. "Population Growth and Poverty in the Developing World," Population Bulletin Vol. 35, No. 5 (Population Reference Bureau, Inc., Washington, D.C., 1980.)

   Explores the relationship between population growth and the absolute poverty which affects some 730 million people in developing countries.

2.* Boserup, Ester. Population and Technological Change: A Study of Long-Term Trends. Chicago: University of Chicago Press, 1981. 255pp. $17.50

   Analyzes the reciprocal effect of technological advancement and institutional change on population growth with special emphasis on developing countries.

3.* Farvar, M. Taghi and John P. Milton eds. The Careless Technology: Ecology and International Development Garden City, NY: The Natural History Press, 1972. 1030pp. o.p.

   A frequently cited collection of essays about the ecological impact of water development and intensified animal and plant productivity. The result of a conference about the ecological aspects of international development given at Airlie House in Warrenton, Virginia, by the Conservation Foundation and the Center for the Biology of Natural Systems, Washington University, December 8 to 11, 1968.

4.* Hauser, Philip M. World Population and Development: Challenges and Prospects. Syracuse, NY: Syracuse University Press, 1979. 683pp. $9.95

   Compiled at the request of Rafael Salas, executive director of the United Nations Fund for Population Activities, this report reviews the status of population and development problems pertinent to the fund. Seventeen papers cover issues such as population and environment, food and world population, interrelationships of health, nutrition and population, demography and population policy.

5. Jackson, Barbara (Ward). Progress for a Small Planet. New York: W.W. Norton and Co., 1979. 305pp. $14.95

   Treats the subject of sustainable development and the complex interactions among such issues as energy, food, agriculture and urbanization.

6. Mamdani, Mahmood. The Myth of Population Control. New York: Monthly Review Press, 1972. 173pp. $4.50

   Disputes the effectiveness of family planning programs with the results of a case study in India.

7. McNamara, Robert S. Accelerating Population Stabilization Through Social and Economic Progress. Development Paper no. 24. Washington, D.C.: Overseas Development Council, 1977. 52pp. $1.50

   In this expanded version of his well-known April 28, 1977, address at the Masachussetts Institute of Technology, McNamara recommends that governments act to accelerate declining fertility rates. Emphasizes policies that combine family planning, nutrition, health, education and women's rights programs.

8. Millar, Jayne C. Focusing on Global Poverty and Development: A Resource Book for Educators. Washington, D.C.: Overseas Development Council, 1974. 630pp. o.p.

   A guide for integrating the development concepts into secondary level courses such as sociology, anthropology, world history, geography, biology, ecology, etc. Treats the subjects of population, environment, foreign assistance, hunger, poverty, development and world interdependence. A good resource guide to films and publications, although dated.

9.* Murdock, William W. The Poverty of Nations: The Political Economy of Hunger and Population. Baltimore, MD: Johns Hopkins University Press, 1980. 382pp. $17.50

Examines the socioeconomic sources of the population problem in developing countries and suggests social and economic changes. Analyzes the physical limits of food production, concluding that there are no biological, physical or technical reasons why problems cannot be solved. Covers the major political and social barriers to these solutions.

10. Rich, William. Smaller Families Through Social and Economic Progress. Washington, D.C.: Overseas Development Council, 1973. 73pp. $2.00

Explores the close relationship between socioeconomic development and population growth. When physical, economic and social conditions are improved, people generally act to limit their family size. Recommends actions the United States can take to improve development efforts and encourage fertility decline.

11. Rihani, May (with Judy Joy). Development as if Women Mattered: An Annotated Bibliography with a Third World Focus. (ODC Occasional Paper 10) Washington, D.C.: Overseas Development Council, 1978. 137pp. $3.00

Covers the fields of health, nutrition and family planning with an action-oriented approach.

12. Schumacher, E.F. Small Is Beautiful: Economics as if People Mattered. New York: Harper and Row, 1973. 305pp. $4.95

A pioneering work in the fields of appropriate technology and sustainable development offering perspectives on the relationships between population, resources and environment.

13. Scientific American. "Economic Development," 243 (3) September, 1980.

Informative articles covering health, food, population, water, energy, projections for the world economy in the year 2000 that include the effects of arms limitation and development in China, India, Tanzania and Mexico.

14.* Todaro, Michael P. Economic Development in the Third World. New York: Longman, 1981. 588pp. $19.95.

A balanced textbook discussion of Third World development problems. Covers theoretical, empirical and policy-oriented perspectives. Contains sections on population, energy and agriculture.

15.* United Nations. The Population Debate: Dimensions and Perspectives. Papers of the 3rd World Population Conference, Bucharest, 1974. New York: United Nations, 1975. Vol. 1 Sales #E/F/S.75.XIII.4 676pp. $36.00
Vol. 2 Sales #E/F/S.75.XIII.5 726pp. $36.00

A series of papers presented at four symposia prior to the World Population Conference. Material from the symposia on Population and Development (in Vol. 1) and Population, Resources and Environment is of particular interest. Other papers included are Population and the Family and Population and Human Rights.

16.* U.S. Congress. House Select Committee on Population. Hearings. Washington, D.C.: U.S.G.P.O., 1978.

Six reports based upon the testimony of experts in the field of population and development. Topics include "World Population: A Global Perspective," "Population and Development: Overview of Trends, Consequences, Perspectives and Issues," and "Fertility and Contraception in America."

17. United States Congress. Office of Technology Assessment. (Phyllis Avedon ed.) World Population and Fertility Planning Techniques: The Next 20 Years. Washington, D.C.: U.S.G.P.O., 1982. Stock #052-003-00867-0. 243pp. $7.50

Covers the status of current and projected technologies affecting fertility change. Discusses trends in population growth to the year 2000; the impact of population growth on resource, environmental, social and political systems; the determinants of fertility change; factors that affect the distribution, use and acceptance of family planning in developing countries; research results and needs and the financial needs and sources of support for population programs in less-developed countries.

SEE ALSO

Critchfield, Richard. Villages (General)

Dasmann, Raymond F., John P. Milton and Peter H. Freeman. Ecological Principles for Economic Development (Deforestation)

Eckholm, Erik. Down to Earth: Environment and Human Needs (General)

Eckholm, Erik. The Dispossessed of the Earth: Land Reform and Sustainable Development (General)

International Union for Conservation of Nature and Natural Resources. World Conservation Strategy: Living Resources for Sustainable Development. (Policy Recommendations)

Jackson, Barbara (Ward). The Home of Man (General)

Jackson, Barbara (Ward) and Rene Dubos. Only One Earth: The Care and Maintenance of a Small Planet (General)

Lappe, Frances Moore and Joseph Collins. Food First (Food and Agriculture)

National Academy of Sciences. Office of the Foreign Secretary. Rapid Population Growth: Consequences and Policy Implications (General)

Scientific American. Food and Agriculture (Food and Agriculture)

Scientific American. The Human Population: A Scientific American Book (General)

Stokes, Bruce. Helping Ourselves: Local Solutions to Global Problems (Policy Recommendations)

U.S. Presidential Commission on World Hunger. Overcoming World Hunger: The Challenge Ahead (Food and Agriculture)

World Bank. Forestry Sector Policy Paper (Deforestation)

Wortman, Sterling and Ralph W. Cummings, Jr. To Feed This World: The Challenge and the Strategy (Food and Agriculture)

REPORTS, MODELING AND FUTURE STUDIES

Reports often use projection for determining and assessing future problems in population, resources and environment. To date, these investigations have been useful to focus greater attention on long-term difficulties, but they are plagued with problems themselves. They usually provide good data and/or analyses on population trends, resources and the environment, but they tend to have gaps, due to straight line projections of the separate components, which create unbalanced overall perspective and assessment. Many are done by short-lived commissions that do not have the ability to implement recommendations. Results are minimal.

The ten-year-old field of global modeling has provided new ways of viewing future studies. It integrates population, capital, agriculture, natural resources and the environment via computers and simulates interactions mathematically. In some models, the world is treated as an aggregate and in others, it is composed of regions.

The field of global modeling was created by concerned academics, business executives and leaders in an organization, formed in 1968, known as The Club of Rome. The Club published Limits to Growth, a highly readable effort which concluded that limits would be reached on the Earth within the next 100 years. The study touched off controversy which encouraged others to improve on the original Massachusetts Institute of Technology simulations or to build other models.

It is useful to remember that all models project current trends into the future and therefore are merely suggestive and not predictive. Moreover, all model conclusions are dependent upon original assumptions, the way models are built and the quality and availabilty of data. Further, many models do not have adequate linkages and feedback between elements. The Global 2000 Report, for example, does not adequately address how environmental degradation affects other factors such as population, capital and resources. Finally, modelers frequently leave little documentation of their efforts, so it is difficult to examine their work. These and other problems are cited by critics of modeling in books such as Models of Doom (edited by H.S.D. Cole), which analysed the Limits to Growth study.

Although these studies have faults, they do provide useful insights, and they frequently arrive at parallel conclusions. One is that there is no purely physical reason why everyone on Earth should not be fed and clothed adequately. The barriers to accomplishing this are economic, social and political. Another broad conclusion is that policy changes to avert crises are needed now rather than later. Finally, many recommend the creation of national and international long-range futures research and analysis institutes to advise governmental leaders on emerging trends.

REPORTS, MODELING AND FUTURE STUDIES

1.** Ascher, William. Forecasting: An Appraisal for Policy Makers and Planners. Baltimore: Johns Hopkins University Press, 1978. 239pp. $5.95

Examines the theory and practice of forecasting and reviews past forecasts for their success and failure.

2.** Ayres, Robert U. Uncertain Futures: Challenges for Decision Makers. New York: John Wiley and Sons, 1979. 429pp. $28.95

A view of the methods and assumptions behind forecasting in such areas as demography, technology, environment, natural resources.

3. Cahn, Robert and Patricia Cahn. "Lessons from the Past" in The Global 2000 Report to the President (see Council on Environmental Quality entry) vol. 2, Appendix A. pp. 685-712

A survey of the major studies of population, resources and environment that have taken place in the past 70 years.

4.* Cole, H.S.D. ed. Models of Doom. New York: Universe, 1973. 244pp. $3.50

A collection of essays which critically examine the approach used in The Limits to Growth study written by members of the Science Policy Research unit of the University of Sussex. A response by the authors of "Limits" is included.

5. Council on Environmental Quality and Department of State. Study Director, Gerald O. Barney. The Global 2000 Report to the President: Entering the Twenty-First Century. Washington, D.C.: U.S.G.P.O., 1980.
Vol. I (Summary Report) stock #S/N 041-011-00037-8 47pp. $3.50
Vol. II (technical report) stock #S/N 041-011-00038-6 766pp. $13.00
Vol. III (documentation on the government's model) stock #S/N 041-011-00051-3 401pp. $8.00
Also available from: Pergamon Press, Elmsford, NY, 1980. (Vol. I and the environment projections in Vol.II) 378pp. $9.50
Penguin Press, New York, 1981. (Vol. I and II) 880pp. $10.00
Blue Angel Press, Charlottesville, VA (Vol. I,II, and Global Future: Time to Act (See annotation under Council on Environmental Quality in Policy Recommendation section.) 1000pp. $9.90

The result of a major three-year study by the Council on Environmental Quality and the Department of State in cooperation with other governmental agencies on the probable changes in world population, natural resources and environment through the end of the century. Depicts conditions that are likely to develop if there are no changes in public policies, institutions or rates of technological change. Projects that without change the world in 2000 will be more crowded, more polluted, less ecologically stable and more vulnerable to disruption than the world we live in today. Includes chapters about population, minerals, energy, forestry, water, food, agriculture, climate, fisheries, environment and present government models and other global models.

6.* Forrester, Jay W. World Dynamics. Cambridge, MA.: Wright- Allen, 1971. 142pp.

The first Club of Rome-sponsored global study made at M.I.T. integrates the variables of population, natural resources, capital investment, agriculture and pollution on a world model (WM 2) and explores the dynamics of their interactions.

7. Herrera, Amilcar O. et al. Catastrophe or New Society? A Latin American World Model. Ottawa: International Reseach Development Center, 1976. 108pp. Available through UNIPUB, New York. $8.75

This world model rose out of a meeting in Rio de Janeiro during discussion of the World Model 3 (Meadows). The nontechnical model description indicates a path toward a world liberation from underdevelopment and misery. Concludes that "the obstacles that currently stand in the way of harmonious development of humanity are not physical or economic in a strict sense, but essentially sociopolitical" and "the only truly adequate way of controlling population growth is by improving basic living conditions."

8.* Holcomb Research Institute. Environmental Modeling and Decision Making: The U.S. Experience. New York: Praeger Publishers, 1976. 152pp. $22.95

Prepared for the International Council of Scientific Union's Scientific Committee on Problems of the Environment. Assesses the state of environmental modeling in the United States, with particular emphasis on environmental policy formation and decision making. Examines modeling in such areas as atmosphere, water resources, ecology, agriculture, urban systems, regional environmental management and world systems. Evaluates case studies of modeling applied to decision making.

9. Independent Commission on International Development Issues (Brandt Commission) North-South: A Program for Survival. Cambridge, MA: The M.I.T. Press, 1980. 204pp. $4.95

Reports on the inequality between the industrialized countries and developing nations. The 18-member commission makes recommendations concerning the least-developed countries, hunger and food, population, the environment, general development, energy, world trade and multinational corporations.

10.* Kahn, Herman, William Brown and Leon Martel. The Next 200 Years. West Caldwell, N.J.: William Morrow and Co., 1976. 241pp. $5.95

Projects an optimistic long-term future in which there is stabilized population and prosperity. Historically examines population growth, economic development, energy, raw materials, food, agriculture and the environment. Suggests that stresses will be overcome, although the evidence is not factually conclusive.

11.** Landsberg, Hans H., Leonard L. Fischman and Joseph L. Fischer. Resources in America's Future: Patterns of Requirements and Availabilities, 1960-2000. Baltimore, MD: Johns Hopkins University Press, 1963. 1017pp. $40.00

Investigates the adequacy of natural resources in the United States from 1960 to 2000 by projecting demand and supply of natural resources, population, labor force, production and income. Interrelates these factors in a systematic way. Includes policy recommendations in light of supply limitations. Recommends that a government agency be created to make periodic projections.

12.* Leontief, Wassily, Anne Carter and Peter Petri. The Future of the World Economy. New York: Oxford University Press for the United Nations, 1977. 110pp. $6.95

Studies the environmental aspects of the future world economy. Concludes that accelerated development will occur if two conditions are met: internal social, political and institutional changes in the developing countries; and significant change in the world economic order. Concludes that population growth problems are solvable through increased food production.

13. McHale, Magda Cordell. (Introduction by Thomas W. Wilson, Jr. and a foreword by Harlan Cleveland) Ominous Trends and Valid Hopes: A Comparison of Five World Reports. Minneapolis: Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 1981. 131pp. $5.00

Reviews trends discussed in The Global 2000 Report to the President (see annotation -- Council on Environmental Quality), World Development Report, 1980 (World Bank), Interfutures: Facing the Future (OECD), North-South: A Programme for Survival (Independent Commission on International Development Issues) and the World Conservation Strategy (IUCN). Reviews the recommendations for action in these reports. Presents a good overall summary.

14.** Meadows, Dennis L. et al. Dynamics of Growth in a Finite World. Cambridge, MA.: Wright-Allen Press, 1974. 637pp.

A detailed description of the World 3 computer model used in the Limits to Growth study.

15.* Meadows, Donnella, John Richardson and Gerhart Bruckman. Groping in the Dark. New York: John Wiley & Sons, Inc., 1981. $26.95

Presents a history of the ten-year global modeling field.

16. Meadows, Donella H., Dennis L. Meadows, Jorgen Randers, William W. Behrens III. The Limits to Growth. New York: Universe Books, 1972. 205pp. $4.50 Also available from New American Library, New York $2.50

A famous and controversial global modeling study created by a team of international researchers at M.I.T. sponsored by the Club of Rome. Relates various assumptions concerning population increases, agricultural production, nonrenewable resource depletion and pollution generation using a computer. Concludes that our growth limit will be reached within the next 100 years if current trends continue. The authors indicate, however, that it is possible to alter these trends and create a sutainable future.

17. Mesarovic, Mihajlo and Eduard Pestel. Mankind at the Turning Point. New York: E.P. Dutton and Co., 1974 210pp. o.p.

This second Club of Rome-sponsored study on world trends presents a more complex model than was illustrated in Limits to Growth because it divides the world into different regions. Although its analysis of resources and population emphasizes the importance of balanced, organic growth, the study is inadequate when considering environmental impact.

18.* National Academy of Sciences. National Research Council. Committee on Resources and Man. Resources and Man: A Study and Recommendations. San Francisco: W.H. Freeman and Co., 1969. 259pp. o.p.

A two-year study which evaluates national and world resources in light of then current and anticipated stresses. Identifies problems for study and opportunities for progress. Concludes "both population control and better resource management are mandatory and should be effected with as little delay as possible." Makes accompanying recommendations.

19.* OECD-Interfutures. Facing the Future: Mastering the Probable and Managing the Unpredictable. Paris: OECD, 1979. 425pp. $20.00

The result of a three-year intergovernmental project on "tne future development of advanced industrial societies in harmony with that of developing countries." Studies rather than forecasts future policy options. Covers the physical limits to growth, past trends and future dimensions, the reaction of advanced industrial societies confronted with change, the relationship of industrial societies and the Third World and the management of world interdependence.

20.* Ridker, Ronald G. and William D. Watson. To Choose a Future: Resource and Environmental Consequences of Alternative Growth Paths. Baltimore and London: Johns Hopkins University Press, 1980. 463pp. $33.50

Assesses the resource and environmental problems that the United States may face over the next 50 years. Evaluates different scenarios in population and economic growth, technological change and trade, environmental and nuclear policies. Uses conventional models as well as computer models.

21.* Swedish Secretariat for Future Studies (prepared by Staffan Sohlman et al.). Resources, Society and the Future. Elmsford, New York: Pergamon Press, 1979. 198pp. $18.00

Examines the global problems of diminishing natural resources and raw materials and their associated political and social implications. Explores resource availability and demand over the next 25 years and suggests policy options for an increasingly interdependent world.

22.* United States Commission on Population Growth and the American Future. Population and the American Future. (The Report of the Commission on Population Growth and the American Future). Washington, D.C.: U.S.G.P.O., 1972 186pp.

The commission was established by President Nixon and the Congress to "examine the growth of our population and the impact it will have upon the American future." The final report, compiled after two years of effort, includes chapters on the dynamics of population growth and distribution, the effect of population on resources and environment, population and immigration, population and public policy and recommendations. Concludes "... in the long run, no substantial benefits will result from further growth of the Nation's population, rather that the gradual stabilization of our population through voluntary means would contribute significantly to the Nation's ability to solve its problems. We have looked for, and have not found, any convincing economic argument for continued population growth." Commission reports include: "Demographic and Social Aspects of Population Growth" (Vol. I), "Economic Aspects of Population Change" (Vol. II), "Population, Resources and the Environment" (Vol. III), "Governance and Population" (Vol. IV), "Population Distribution and Policy" (Vol. V), "Aspects of Population Growth Policy" (Vol. VI) and "Statements at Public Hearings" (Vol. VII).

23. World Bank. World Development Report. New York: Oxford University Press, 1981. 192pp. $6.95

A series of multifaceted reports (annually since 1978) which are a rich source of data analyzing poverty, health, economic growth, energy, population and human development.

SEE ALSO

Harman, Willis W. An Incomplete Guide to the Future (Policy Recommendations)

International Union for Conservation of Nature and Natural Resources. World Conservation Strategy: Living Resources for Sustainable Development

United Nations Economic and Social Council. Interrelationships Between Population, Resources, Environment and Development: Report of the Secretary-General (General)

POLICY RECOMMENDATIONS

Changes evolve through a combination of market forces, responses to public policy and shifts in life-styles, but when they occur and how stressful they are can be a choice of people.

The United States has special responsibility for dealing with changes because of its material and intellectual wealth and its position as an international leader. There are also moral and national security reasons:

- An estimated 700 million people worldwide suffer in poverty.
- Stresses in biological systems may diminish availability of resources that this country and the world depend on for food, fuel, clothing and shelter.
- Stresses affect political and social stability of countries supplying key natural resources.
- Our own resources may be strained and diminished.
- Migration from areas of resource impoverishment poses problems for the United States as well as other nations.
- Disputes between countries over resources may intensify.
- Global changes could seriously affect agricultural production, sea level and other vital factors.

Holistic strategies designed to deal with the full range of problems are presented in publications listed in this section, but the enactment of programs requires substantial investment. For example, it is estimated that family planning designed to achieve more rapid population stabilization would require annually approximately three billion dollars compared to the present one billion. However, substantial expenditure now may be considerably less costly than ameliorating the full-blown consequences of these problems at some later time.

Strategies must be based on solid and comprehensive data and continuing research. The Global Resources, Environment and Population Act of 1981 (S1771, sponsored by Senator Mark Hatfield) is but one proposal for coordinating data collection and analysis in the federal government.

Any strategy will be difficult to implement without effective leadership and citizen involvement. On a personal level, U.S. citizens can change their life-styles by installing insulation in homes, reducing automobile trips, limiting family size, recycling, reducing food waste and relying more on home-grown products.

POLICY RECOMMENDATIONS

1. Allen, Robert. How to Save the World: Strategy for World Conservation. New York: UNIPUB, 1980 #IUCN79 150pp. $12.00 Also available from Littlefield Adams, Totowa, New Jersey for $4.95

   Based on The World Conservation Strategy (see International Union for Conservation of Nature and Natural Resources), this book describes some of the global resource and environmental problems that threaten human survival and recommends corrective actions.

2. Barney, Gerald O. ed. The Unfinished Agenda: The Citizen's Policy Guide to Environmental Issues. New York: Crowell, 1977. 184pp. $3.95

   A description of population, resource and environmental problems with recommendations for action in each of these areas.

3.* Botkin, James W., Mahdi Elmandjra and Mircea Malitza. No Limits to Learning. (A Report to the Club of Rome) Elmsford, NY: Pergamon Press, 1979, 159pp. $7.00

   Discusses the importance of incorporating global concepts, participatory thinking, and foresight into educational programs. Presents some excellent and innovative ideas.

4. Brown, Lester R. and Pamela Shaw. Six Steps to a Sustainable Society. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 48), 1982. 63pp. $2.00

   A distillation of the major policy recommendations made in Building a Sustainable Society (see Brown annotation). The six policy areas are stabilizing world population growth, protecting cropland, reforestation, recycling, energy conservation and development of renewable energy.

5. Brown, Lester R. Building a Sustainable Society. New York: W.W. Norton and Co., 1981. 433pp. $14.95

   The converging global demands on soil, biological systems, fossil fuels, agricultural systems, continued inflation and emerging social stresses all point to the need for today's world to follow a path to sustainability. Cites the progress toward creating a sustainable society that has been made in population stabilization, natural resources and renewable energy. Notes the changes in government, business, religion, nonprofit organizations, media, academia and individuals.

6. Council on Environmental Quality and the Department of State. Global Future: Time to Act: Report to the President on Global Resources, Environment and Population. Washington, D.C.: U.S.G.P.O., 1981. 209pp. $7.00

   Report of a task force making recommendations in response to the forecasts in the Global 2000 Report. Recommendations focused on building and maintaining a sustainable society are made in the areas of population, food and agriculture, renewable energy resources and conservation, tropical forests, biological diversity, coastal, marine and water resources and global pollution. Includes suggestions for improving the national capacity to respond to changes in population, resources and the environment.

7. Crowe, Beryl L. "The Tragedy of the Commons Revisited," Science 166 (3909) November 28, 1969. pp. 1103-1107

   Links the difficulty of solving problems related to global population, atomic war and environmental degradation to specialization. Concludes that the division between natural and social science tends to fragment and defuse constructive effort. Refutes the position that coercive force will lead to solutions. (see Hardin "The Tragedy of the Commons").

8. The Ecologist. "Blueprint for Survival," (Special issue) 2(1), January 1972. 44pp. Also available in an expanded version (book form): Editors of the Ecologist. Blueprint for Survival. New York: New American Library, 1974. 144pp. $1.50

   An early call for action in which a team of 33 British scientists describe global population, resource and environmental problems and offer a program to create a more sustainable society.

9.* Falk, Richard. This Endangered Planet: Prospects and Proposals for Human Survival. New York: Random House, 1971. 495pp. o.p.

Discusses the political dimensions of war, population pressure, insufficient resources and environmental overload. Examines today's world order and proposes a new more stable plan.

10.** Hamrin, Robert D. Managing Growth in the 1980s: Toward a New Economics. New York: Praeger, 1980. 295pp. $28.95

Follows a transformation from traditional economics to an economic paradigm that will be future-oriented, holistic, humanistic and not necessarily supportive of growth. Explores the concepts of growth limits in resources production and global interdependence in terms of natural resources.

11.* Harman, Willis W. An Incomplete Guide to the Future. Stanford, CA.: Stanford Alumni Association, 1976. 150pp. $6.75 (Also available from New York: W.W. Norton, 1979 $4.95)

A thoughtful and well-written discussion of possible paths for the future. Reviews futures research; social and environmental problems in growth-oriented industrial society; problems of employment; and problems of resource distribution both within and among nations. Describes the effect of industrial society on individual consciousness. Concludes by offering strategies for a transition to a "trans-industrial" society in which technological, social and environmental conflicts are lessened and human values and citizen participation are stressed.

12. Hatfield, Senator Mark O. "Global Resources, Environment and Population Act of 1981" (S. 1771). Congressional Record 127 (153), 1981.

The text of a bill which would, "establish in the Federal Government a global foresight capability with respect to natural resources, the environment and population; establish a national population policy; establish an interagency council on Global Resources, Environment and Population." Its counterpart in the House is the Ottinger Bill.

13. Hayes, Denis. Repairs, Reuse, Recycling -- First Steps toward a Sustainable Society. Washington, D.C.: Worldwatch Institute (Worldwatch Paper 23), 1978. 45pp. $2.00

Explores methods for reducing raw resource consumption and waste. Such methods would save energy, reduce environmental costs and decrease greater per capita consumption in developed countries.

14.* Henderson, Hazel. The Politics of the Solar Age: Alternatives to Economics. Garden City, NY.: Anchor Books, 1981. 433pp. $8.95

Discusses the emerging transition from traditional and compartmentalized political and economic thought developed over 250 years ago to more holistic, equitable, global and environmentally oriented thinking that will fit better with a larger world population and scarcer resources.

15.* International Union for Conservation of Nature and Natural Resources, with advice and cooperation from the United Nations Environment Program and World Wildlife Fund. World Conservation Strategy: Living Resources for Sustainable Development. Gland, Switzerland: IUCN, 1980. Also available from New York: UNIPUB. Order #IUCN82 $20.00

Describes current problems in basic life-support ecosystems; agriculture, forest, coast and freshwater systems; and in loss of species. Offers crucial economic reasons for maintenance of these systems and species. Proposes a conservation strategy on both national and international levels which includes research training, policy making, environmental planning, management, education and economic development.

16.* Jacobsen, Willard J. Population Education: A Knowledge Base. New York: Teachers College Press, 1979. 267pp. $15.95

A well-written and comprehensive text on how to incorporate population concepts into secondary-school teaching programs. Includes chapters on "Populations and their Environments," "Population and Resources" and sections on the demographic and health aspects of population.

17. Johnson, Warren. Muddling Toward Frugality. Boulder, CO.: Shambala Publications, Inc., 1978. 252pp. $2.95

An optimistic view of American life in the coming era of resource scarcity. Contends that developed countries will slowly and inevitably adapt their habits to a frugal and sustainable life-style built on renewable resources. Developing countries will have only one major task -- population control. Includes a brief ecological view of history, an explanation of the interaction between technology and resources and a description of the transition from abundance to scarcity.

18. National Audubon Society. The Guide for Citizen Action New York: National Audubon Society, 1981 40pp. $2.50

Discusses strategies for influencing the political process, especially at the national level.

19.* Ophuls, William. Ecology and the Politics of Scarcity: Prologue to a Political Theory of the Steady State. San Francisco: W.H. Freeman and Co., 1977. 303pp. $9.95

Asserts that we must accept the concept of limits and immediately work toward a steady state society with a new political philosophy and a new set of political institutions. Each chapter contains a literaure discussion section, making the book an excellent research tool.

20.* Orr, David W. and Marvin S. Soroos eds. The Global Predicament: Ecological Perspectives on World Order. Chapel Hill: University of North Carolina Press, 1979. 398pp. $9.95

Explores the political and legal problems of global interactions between population, resources and the environment.

21. Ottinger, Representative Richard L. "Legislation to Establish Population Policy," Congressional Record 127 (9), 1981.

This bill "declares the goal of population stabilization by voluntary means as the keystone of a national policy of planning for demographic change; grants the Federal Government the capacity to more accurately forecast and effectively respond to short-term and long-term trends in the relationships between population, resources and the environment." Also establishes an office of population policy to carry out these functions.

22. Peccei, Aurelio. One Hundred Pages for the Future. Elmsford, NY.: Pergamon Press, 1981. 191pp. $12.50

A highly readable and future-oriented analysis of the growing global interdependencies and crises among population, resources and the environment written by the president of the Club of Rome. Reviews and recommends proposals designed to ameliorate these crises.

23. Science Council of Canada. Population, Technology and Resources. Ottawa, Canada: Science Council of Canada, 1976. 91pp. $2.40

A thoughtful study that reviews demographic trends in Canada and their impact on employment, urban areas, land use, food supplies and energy. For a country with a relatively low population of 23 million in 1976 and a seemingly large store of resources, surprisingly long-term recommendations are made for slowing population growth and immigration. Recommendations are also made in the areas of urban and agricultural land use, food production and consumption and energy planning and conservation.

24. Sprout, Harold and Margaret. Toward a Politics of the Planet Earth. New York: Nostrand Reinhold Company, 1971. 499pp.

A look at world politics from an ecological perspective.

25. Stokes, Bruce. Helping Ourselves: Local Solutions to Global Problems. (A Worldwatch Institute Book) New York: W.W. Norton and Company, 1981. 160pp. $4.95

Shows how global problems such as inflation, energy and environment can be handled at local levels. Examines self-help efforts in the areas of employment, energy, housing, food production, health and family planning.

26. Study of Critical Environmental Problems. Man's Impact on the Global Environment: Assessment and Recommendations for Action. Cambridge, MA.: M.I.T. Press, 1970. 319pp. o.p.

A frequently cited source, the result of an intensive study by more than 40 scientists and professonals using pre-1968 data to analyze "the global climatic and ecological effects of pollution in the atmosphere-land-ocean system." Recommends the necessary "research monitoring and action that will be required to understand further the nature of potential threats to the global environment so that effective action can be taken to avert future crises.

SEE ALSO

Brown, Lester. Resource Trends and Population Policy: A Time for Reassessment (General)

Brown, Lester. The Twenty-Ninth Day: Accommodating Human Needs and Numbers to the Earth's Resources (General)

Daly, Herman. Steady State Economics (General)

Independent Commission on International Development Issues (Brandt Commission) North-South: A Program for Survival (Reports, Modeling and Future Studies)

U.S. Interagency Task Force on Tropical Forests. The World's Tropical Forests: A Policy, Strategy and Program (Deforestation)

Watt, Kenneth E.F. The Titanic Effect (General)

OTHER BIBLIOGRAPHIES

1. Anglemeyer, Mary, Eleanor R. Seagraves and Catherine C. LeMaistre. Sponsored by the Rachel Carson Council, Inc.(with an introduction by S. Dillon Ripley). A Search for Environmental Ethics: An Initial Bibliography. Washington, D.C.: Smithsonian Institution Press, 1980. 119pp. $8.95

   A guide to the literature in the field of environmental ethics. Treats topics such as population, endangered species and pollution, with 446 entries and additional bibliographies.

2. Bussink, Tine, Jean van der Tak and Connie S. Zuga. Sourcebook on Population: 1970-1976. Washington, D.C.: Population Reference Bureau, 1976. 72pp. $3.95

   A useful annotated bibliography listing publications on demography, general population problems, population and food supply, population and its relation to resources and the environment, general population policy, population trends in various countries and population education. Includes listings of other bibliographies, periodicals, population education programs and population organizations.

3. Hammond, Kenneth A., George Macinko and Wilma B. Fairchild. Sourcebook on the Environment: A Guide to the Literature. Chicago: The University of Chicago Press, 1978. 613pp. $25.00

   A comprehensive guide to selected aspects of environmental literature compiled by the Association of American Geographers. Twenty-six specialists comment on such topics as "Conceptual Frameworks for the Study of Humans and Their Environment," "Resource Scarcity: A Persistent Environmental Concern," "Ecosystems Models and Energy Flow Analysis," "The Limits to Growth Controversy," "Agricultural Activities and Environmental Stress," "Human Population and the Environment," and "Energy and the Environment."

4. Murphy, Elaine, Nancy Fitzpatrick and Patricia Cancellier. Population Education: Sources and Resources. (revision of 1975 edition prepared by Judith Seltzer and JoAnn Robinson) Washington, D.C.: Population Reference Bureau, 1979. 29pp. $1.00

   Annotated listing of population and environmental education publications, charts, films and slide shows. Includes listings of high-school texts dealing with population, organizations involved with population education and population bibliographies.

81

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